# CAUVERY COLLEGE FOR WOMEN(AUTONOMOUS)

## Nationally Accredited with 'A+' Grade by NAAC

## ISO 9001:2015 Certified

## TIRUCHIRAPPALLI

### DEPARTMENT OF INFORMATION TECHNOLOGY

# SYLLABUS

# 2022 - 2023

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

**Nationally accredited (IV Cycle) with "A+" Grade**

**ISO 9001:2015 Certified**

**Annamalai Nagar, Tiruchirappalli – 18**

# DEPARTMENT OF INFORMATION TECHNOLOGY

## Vision

The Department of Information Technology envisions to create technically competent, skilled intellectual IT professionals, efficient problem solvers, innovators and entrepreneurs to meet the current challenges of the modern computing industry.

## Mission

- To provide quality education and elevate the students towards higher educational programs
- To encourage and guide the students to improve their competency skills in information technology market
- To equip the students to cater the industrial demands through providing advance training

## Programme Structure for Science Departments

| 1 | Course | No of Courses | Credits | Total Credits |
|---|---|---|---|---|
| I | Tamil/ Other Language | 4 | 12 | 12 |
| II | English | 4 | 12 | 12 |
| III | Core (Theory& Practical) | 17 | 77 | 109 |
| | Project Work | 1 | 4 | |
| | Internship | 1 | 2 | |
| | First Allied | 3 | 9 | |
| | Second Allied | 3 | 9 | |
| | DSE | 2 | 8 | |
| IV | GEC | 2 | 4 | 16 |
| | SEC | 2 | 4 | |
| | AECC-I-Universal Human Values | 1 | 2 | |
| | AECC-II-Environmental Studies | 1 | 2 | |
| | AECC-III- Innovation and Entrepreneurship | 1 | 1 | |
| | AECC-IV- Professional Skills | 1 | 2 | |
| | Gender Studies | 1 | 1 | |
| V | Extension Activities | - | 1 | 01 |
| | | 44 | | 150 |

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

| PEOs | Statements |
|---|---|
| **PEO1** | **LEARNING ENVIRONMENT**<br>To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields. |
| **PEO2** | **ACADEMIC EXCELLENCE**<br>To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal. |
| **PEO3** | **EMPLOYABILITY**<br>To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains. |
| **PEO4** | **PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY**<br>To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation. |
| **PEO5** | **GREEN SUSTAINABILITY**<br>To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development. |

| PO NO. | Programme Outcome |
|---|---|
| | On completion of BSc-IT Programme, The students will be able to |
| PO 1 | **Academic Skills & Social Responsibility**<br>Apply Computing, Mathematical and Scientific knowledge in various disciplines by understanding the concerns of the society. |
| PO 2 | **Critical Thinking and Innovative Progress**<br>Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands. |
| PO 3 | **Personality Development**<br>Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities. |
| PO 4 | **Lifelong Learning**<br>Identify resources for Professional development and apply the skills and tools necessary for computing practice to gain real life experiences. |
| PO 5 | **Creativity and Holistic Approach**<br>Create a Scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity. |

| PSO NO | Programme Specific Outcomes<br>Students of B.Sc information Technology will be able to | POs Addressed |
|---|---|---|
| PSO 1 | To apply the knowledge of Science and Computing in Information Technology | PO1 |
| PSO 2 | Analyze the local and global impact of computing on individuals, organizations, society and implant lifelong learning for professional development | PO4 |
| PSO 3 | Improve the capability to apply the knowledge in interrelated domains and solve real world problems with modern technological tools | PO2 |
| PSO 4 | To strengthen the academic quality, effective communication, good ethics and responsibilities during professional practice | PO5 |
| PSO 5 | Excel in job oriented skills which are required to meet the current demand in the field of IT industry and to become an entrepreneur with confidence | PO3 |

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS – LOCF)
(For the Candidates admitted from the Academic year 2022-2023 and onwards)

| Semester | Part | Course | Course Title | Course Code | Inst. Hrs. / week | Credits | Exam | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Hrs | Marks | | |
| | | | | | | | | In | Ext | |
| I | I | Language Course -I (LC) | இக்கால இலக்கியம் | 22ULT1 | 6 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi literature & Grammar-I | 22ULH1 | | | | | | |
| | | | History of popular Tales literature and Sanskrit story | 22ULS1 | | | | | | |
| | | | Basic French – I | 22ULF1 | | | | | | |
| | II | English Language Course- I(ELC) | Functional English for Effective Communication- I | 22UE1 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – I(CC) | Programming in C | 22UIT1CC1 | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical - I (CP) | Programming in C (P) | 22UIT1CC1P | 3 | 3 | 3 | 40 | 60 | 100 |
| | | First Allied Course-I(AC) | Essential Mathematics | 22UIT1AC1 | 4 | 3 | 3 | 25 | 75 | 100 |
| | | First Allied Course-II(AC) | Numerical Analysis and Statistics | 22UIT1AC2 | 4 | 3 | 3 | 25 | 75 | 100 |
| | IV | Ability Enhancement Compulsory Course-I (AECC) | UGC Jeevan Kaushal-Universal Human Values | 22UGVE | 2 | 2 | | 100 | | 100 |
| | **Total** | | | | **30** | **22** | | | | **700** |
| II | I | Language Course-II(LC) | இடைக்கால இலக்கியமும், புதினமும் | 22ULT2 | 5 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi Literature & Grammar – II | 22ULH2 | | | | | | |
| | | | Poetry, Textual Grammar and Alankara | 22ULS2 | | | | | | |
| | | | Basic French – II | 22ULF2 | | | | | | |
| | II | English Language Course- II(ELC) | Functional English for Effective Communication- II | 22UE2 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – II (CC) | Data Structures & Algorithms | 22UIT2CC2 | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical - II (CP) | Data Structures using C(P) | 22UIT2CC2P | 2 | 2 | 3 | 40 | 60 | 100 |
| | | Core Course-III(CC) | Digital Fundamentals | 22UIT2CC3 | 4 | 4 | 3 | 25 | 75 | 100 |
| | | First Allied Course-III(AC) | Operations Research | 22UIT2AC3 | 4 | 3 | 3 | 25 | 75 | 100 |
| | IV | Ability Enhancement Compulsory Course-II(AECC) | Environmental Studies | 22UGEVS | 2 | 2 | - | 100 | - | 100 |
| | | Ability Enhancement Compulsory Course-III(AECC) | Innovation and Entrepreneurship | 22UGIE | 2 | 1 | - | 100 | - | 100 |
| | | Extra Credit Course | SWAYAM | | **As per UGC Recommendation** | | | | | |
| | **Total** | | | | **30** | **23** | | | | **800** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| III | I | Language Course-III (LC) | காப்பியமும், நாடகமும் | 22ULT3 | 5 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi Literature & Grammar - III | 22ULH3 | | | | | | |
| | | | Prose, Textual Grammar and Vakyarachana | 22ULS3 | | | | | | |
| | | | Intermediate French - I | 22ULF3 | | | | | | |
| | II | English Language Course-II(ELC) | Learning Grammar Through Literature- I | 22UE3 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course– IV(CC) | Relational Database Management Systems | 22UIT3CC4 | 6 | 6 | 3 | 25 | 75 | 100 |
| | | Core Practical - III(CP) | RDBMS (P) | 22UIT3CC3P | 3 | 3 | 3 | 40 | 60 | 100 |
| | | Second Allied Course- I(AC) | Financial Accounting | 22UIT3AC4 | 4 | 3 | 3 | 25 | 75 | 100 |
| | | Second Allied Course-II(AP) | Computer Applications in Business (P) | 22UIT3AC5P | 4 | 3 | 3 | 40 | 60 | 100 |
| | IV | Generic Elective Course-I(GEC) | Web Design | 22UIT3GEC1 | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | Basic Tamil - I | 22ULC3BT1 | | | | | | |
| | | | Special Tamil - I | 22ULC3ST1 | | | | | | |
| | | Extra Credit Course | SWAYAM | | **As per UGC Recommendation** | | | | | |
| **Total** | | | | | **30** | **23** | | | | **700** |

**15 Days INTERNSHIP during Semester Holidays**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IV | I | Language Course IV(LC) | பண்டைய இலக்கியமும் உரைநடையும் | 22ULT4 | 6 | 3 | 3 | 25 | 75 | 100 |
| | | | Hindi Literature & Functional Hindi | 22ULH4 | | | | | | |
| | | | Drama, History of Drama Literature | 22ULS4 | | | | | | |
| | | | Intermediate French – II | 22ULF4 | | | | | | |
| | II | English Language Course - IV(ELC) | Learning Grammar Through Literature-II | 22UE4 | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – V(CC) | Programming in JAVA | 22UIT4CC5 | 6 | 6 | 3 | 25 | 75 | 100 |
| | | Core Practical - IV(CP) | Programming in JAVA(P) | 22UIT4CC4P | 4 | 4 | 3 | 40 | 60 | 100 |
| | | Second Allied Course-III(AC) | Business Communication | 22UIT4AC6 | 4 | 3 | 3 | 25 | 75 | 100 |
| | | Internship | Internship | 22UIT4INT | | 2 | - | - | - | 100 |
| | IV | Generic Elective Course II-(GEC) | Web Design (P) | 22UIT4GEC2P | 2 | 2 | 3 | 40 | 60 | 100 |
| | | | Basic Tamil - II | 22ULC4BT2 | | | | 25 | 75 | |
| | | | Special Tamil - II | 22ULC4ST2 | | | | | | |
| | | Skill Enhancement Course – I(SEC) | PC Packages (P) | 22UIT4SEC1P | 2 | 2 | 3 | 40 | 60 | 100 |
| | | Extra Credit | SWAYAM | As per UGC Recommendation | | | | | | |
| | **Total** | | | | **30** | **25** | | | | **800** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V | III | Core Course – VI(CC) | Operating Systems | 22UIT5CC6 | 6 | 6 | 3 | 25 | 75 | 100 |
| | | Core Course - VII(CC) | Programming in Python | 22UIT5CC7 | 6 | 6 | 3 | 25 | 75 | 100 |
| | | Core Practical – V(CP) | Programming in Python (P) | 22UIT5CC5P | 4 | 4 | 3 | 40 | 60 | 100 |
| | | Core Course – VIII(CC) | Software Engineering | 22UIT5CC8 | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Discipline Specific Elective – I(DSE) | A) Mobile Application Development | 22UIT5DSE1A | 5 | 4 | 3 | 25 | 75 | 100 |
| | | | B) Big Data Analytics | 22UIT5DSE1B | | | | | | |
| | | | C) Cloud Computing | 22UIT5DSE1C | | | | | | |
| | IV | Ability Enhancement Compulsory Course-IV (AECC) | UGC Jeevan Kaushal -Professional Skills | 22UGPS | 2 | 2 | - | 100 | - | 100 |
| | | Skill Enhancement Course – II(SEC) | Cloud Computing (P) | 22UIT5SEC2P | 2 | 2 | 3 | 40 | 60 | 100 |
| | | Extra Credit | SWAYAM | As per UGC Recommendation | | | | | | |
| | | **Total** | | | 30 | 29 | | | | **700** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| VI | III | Core Course – IX(CC) | Computer Networks | 22UIT6CC9 | 6 | 6 | 3 | 25 | 75 | 100 |
| | | Core Course– X(CC) | Web Technologies | 22UIT6CC10 | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course– XI(CC) | Cyber Security | 22UGCS | 5 | 4 | 3 | 25 | 75 | 100 |
| | | Core Practical –VI(CP) | Web Technologies (P) | 22UIT6CC6P | 3 | 3 | 3 | 40 | 60 | 100 |
| | | Discipline Specific Elective – II (DSE) | A. Internet of Things | 22UIT6DSE2A | 5 | 4 | 3 | 25 | 75 | 100 |
| | | | B.C# Programming | 22UIT6DSE2B | | | | | | |
| | | | C.Artificial Intelligence & Expert Systems | 22UIT6DSE2C | | | | | | |
| | | Project Work | Project Work | 22UIT6PW | 5 | 4 | - | - | 100 | 100 |
| | IV | Gender Studies | Gender Studies | 22UGGS | 1 | 1 | | - | 100 | 100 |
| | V | Extension activity | | 22UGEA | 0 | 1 | 0 | - | - | - |
| | | | | **Total** | **30** | **28** | | | | **700** |
| | | | | **Grand Total** | **180** | **150** | | | | **4400** |

| Semester I | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UCS1CC1/ 22UCA1CC1/ 22UIT1CC1** | **PROGRAMMING IN C** | **CORE COURSE – I(CC)** | **5** | **5** |

## Course Objectives

- To understand the basics of C language
- To get the deep knowledge of programming using C language
- To develop logics which will help them to create programs and applications in C
- Enhance skill on problem solving by constructing algorithms

## Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Define the basic concepts of C Programming | K1 |
| CO2 | Illustrate the components of C programming | K2 |
| CO3 | Build algorithms and data structures swiftly and faster computation using programs | K3 |
| CO4 | Apply the knowledge of programming concepts to develop programs | K4 |
| CO5 | Solve real time problems using C | K5 |

## Mapping of CO with PO and PSO

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **2** | **3** | **2** | **1** | **2** | **2** | **2** | **3** | **2** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **3** | **2** | **2** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Developing a program in C:** Algorithm-Pseudocode-Flowchart- Planning a C program- Writing a C program- Compile and Run a C Program-**Overview of C:** – Structure of C program – Character set-Tokens – Data types – Variables – Declaration of variables - symbolic constant – Operators and Expressions | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **Managing Input and Output Operations:** Reading and Writing a character -Formatted Input and Output. **Decision Making and Branching:** If, Switch, The ?: operator - The GoTo Instruction – **Decision Making and Looping:** Introduction – While, DO, For Statements –Jumps in Loops. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **Array:** One dimensional array – Two and multidimensional array – Character array – String functions – **User-Defined Functions:** Need for User -Defined Functions –A Multi-Function Program-Elements of User-Defined Functions-Definition of Functions –Return values and Their Types-Function Calls- Function Declaration- Category of Functions – Nesting of Functions - Recursion - Storage Class-The scope and lifetime of variables in functions. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **Structures and Unions:** Structure definition – Structure Initialization – Array of structure – Array within structure –Structure within Structure-Union– **Pointers:** Understanding pointers - Accessing the address of a variable - Declaring and Initializing pointers - Accessing a variable through its pointers - Pointer Expressions - Pointers and Arrays - Pointers and Character strings. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | **File Management:** Defining and Opening File –Closing a File – I/O operations on Files – error handling during I/O operations – Random Access to Files- Command Line Arguments. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Develop algorithms for real time scenario, Area calculations, and Conversion programs, swapping numbers (with and without using temporary variable).<br>Programs for checking eligibility, Triangle formation, Sum of numbers, sum of series, Array manipulations (Sorting, searching, insert, delete and merging), String handling programs, Dynamic memory management using pointers, Employee pay bill preparation using Files. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

**Textbooks**

1. Balagurusamy.E. (2017). Programming in ANSI C, 7th Edition, Mc Graw Hill Education New Delhi.
2. Byron Gottfried. (2018). Programming with C, 4th Edition, Tata McGraw Hill.

**References**

1. Yashavant Kanetkar, (2020). Let Us C, 16th Edition, BPB Publications, New Delhi.
2. Ashok N. Kamthane, Amit Ashok Kamthane (2015). Programming in C, 3rd Edition, Pearson India Education Services Pvt. Ltd.

**Web References**

1. https://www.learn-c.org/
2. https://www.cprogramming.com/
3. https://www.tutorialspoint.com/cprogramming/index.htm

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designers**

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.
2. Ms. R. Sridevi, Assistant Professor, Department of Computer Applications.

| Semester I | Internal Mark: 40 | | External Mark: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT1CC1P** | **PROGRAMMING IN C (P)** | **CORE COURSE I(CP)** | **3** | **3** |

**Objectives:**

- To develop and execute C programs
- To apply the knowledge of control structures, Arrays and functions
- To manipulate C functions

**Course Outcomes and Cognitive Level Mapping**

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Recall program execution and Debugging | **K1** |
| **CO2** | Demonstrate the ideas of control structures | **K2** |
| **CO3** | Make use of functions, arrays, apply string handling functions and develop files | **K3** |
| **CO4** | Develops the ability to analyze a problem and implement an algorithm to solve it. | **K4** |
| **CO5** | Acquire logical thinking, Identify the correct and efficient ways of solving problems | **K5** |

**Mapping with Programme Outcomes**

| COs\ POs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **1** | **2** | **3** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **2** | **2** | **2** | **3** |
| **CO3** | **3** | **2** | **2** | **2** | **2** | **3** | **3** | **2** | **3** | **2** |
| **CO4** | **3** | **3** | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **2** | **3** |

**Syllabus**

1. Simple Programs
2. Control Structures – Branching statements
3. Control structures – Looping statements
4. Array Manipulations
5. Handling Strings
6. Implementation of functions
7. Applications of Pointers
8. Structures and Files
9. Programs using Graphics functions
10. Simple game programs
11. Special programs

- Ring a bell
- Printing patterns
- String tokenizer
- Use Sleep function

| Semester I | InternalMarks:25 | | External Marks:75 | |
|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | CATEGORY | Hrs/Week | CREDITS |
| 22UCS1AC1/ 22UCA1AC1/ 22UIT1AC1 | ESSENTIAL MATHEMATICS | ALLIED | 4 | 3 |

## Course Objectives

- **Apply** the basic concepts of Differentiation, Integration and their applications.
- **Compute** mathematical quantities using ordinary and partial differential equations.
- **Explore** fundamental concepts in graph theory.

## Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| COl | Remember and recall the basic concept of essential mathematics. | Kl |
| CO2 | Illustrate the various notions in the respective streams. | K2 |
| CO3 | Apply the different terminologies of essential mathematics. | K3 |
| CO4 | Classify the solution of mathematical problems using various techniques. | K4 |
| CO5 | Examine the solution of mathematical problems. | K4 |

## Mapping of CO with PO and PSO

| COs | PSOl | PSO 2 | PSO 3 | PSO 4 | PSO5 | PO1 | PO 2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| COl | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |

**"1" - Slight (Low) Correlation "2" - Moderate (Medium) Correlation**

**"3" - Substantial (High) Correlation "-" indicates there is no correlation**

**Syllabus**

| UNIT | CONTENT | HOURS | COS | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Matrices**<br>Matrix - Special types of matrices - Scalar multiplication of a matrix - Equality of matrices - Addition of matrices - Subtraction - Multiplication of Matrices - Inverse matrix- Relation between adjoint and inverse matrices - Solution of simultaneous equations - Rank of a matrix - A system of *m* homogeneous linear equations in *n* u:rikiiowns - System of non-homogeneous linear equations - Eigen values and Eigenvectors - Similar matrices- Cayley-Hamilton Theorem (proof not needed) - Simple applications only | 12 | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |
| II | **Differentiation**<br>Maxima and Minima (Problems Only) -Points of inflexion.<br>**Partial differentiation**<br>Functions of function rule - Total Differential Coefficient - A Special case - Implicit Fun,ctions - Homogeneous functions - Euler's Theorsm- (proof not needed) - Simple problems only. | 12 | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |
| III | **Integration**<br>Integration of Rational algebraic_functions - Rule (a) - Rule (b): Type **i:f** $\frac{}{ax^{2}+l;.r+c}$ Type 11: $\int \frac{;'t''t-m}{a.;:\ -1-brlc}\ d¥$ - Integration of Irrational functions : Case (ii) Integration of the form $\int \frac{./}{ar-+z:r+c}$ $\frac{P\ ;r+;,}{}$ - Type $\int \frac{a.r}{a+lJ\&OS:C}$ - Properties of definite integrals. | 12 | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |
| IV | **Differential Equations**<br>Linear Differential Equation with constant coefficients - The Operators *D* and $n-^{1}$ - Particular Integral - Special methods of finding P.I.: *Xis* of the form (a) *eox* (b) *cosax* or *sinax*, where *a* is a constant (c) *xm* (a power of *x), m* being a positive integer (d) *eax:V,* where *Vis* any function of *x.* | 12 | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |
| V | **Graph Theory**<br>Introduction - Definition of Graphs - Applications of Graphs - Finite and infinite graphs - Incidence and Degree - Isolated Vertex, Pendant Vertex and Null Graph. | 12 | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |

| | | | | |
|---|---|---|---|---|
| | **Path and Circuits**<br>Isomorphism - Subgraphs - Walks, Paths and Circuits - Connected Graphs, Disconnected Graphs and Components - Euler graphs. | | | |
| VI | **Self-Study for Enrichment**<br>**(Not included for End Semester Examination)**<br>Symmetric matrix - Skew symmetric matrix - Hermitian and skew Hermitian matrices Concavity and Convexity- Integration by parts - Linear equation - Hamiltonian Paths and Circuits. | - | CO1, CO2, CO3, CO4, CO5 | Kl, K2, K3, K4 |

**Textbooks**


1. T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy.(2015). Algebra, Volume
2. II. S. Viswanathan (Printers & Publishers) Pvt., Ltd.
3. S.Narayanan, T.K.Manicavachagom *Pillay.(2015).Calculus,Volume I.* S. Viswanathan (Printers & Publishers) Pvt., Ltd.
4. S.Narayanan, T.K.Manicavachagom *Pillay.(2015).Calculus,Volume II.* S. Viswanathan (Printers & Publishers) Pvt., Ltd.
5. S.Narayanan, T.K.Manicavachagom *Pillay.(2015).Calculus,Volume III.* S. Viswanathan (Printers & Publishers) Pvt., Ltd.
6. Narsingh Deo. (2003). *Graph Theory with applications to Engineering and Computer.* Prentice Hall of India Private Limited


UNIT-I Chapter 2: Section 1 to 5, 7, 8, 10 to 16[1]

UNIT-II Chapter V: Section 1.1 to 1.5[2]

Chapter Vlll: Section 1.2 to 1.6[2]

UNIT-III Chapter 1: Section 7.1 to 7.3, 8 (CASE II), 9, 11[3]

UNIT-IV Chapter 2: Section 1 to 4[4]

UNIT-V Chapter 1: Section 1.1 to 1.5[5]

Chapter 2: Section 2.1, 2.2, 2.4 to 2.6[5]

**Reference Books**


1. A.Singaravelu. (2003). *Allied Mathematics.* AR.Publications
2. P.R.Vittal. (2014). *Allied Mathematics*. Margham Publications, Chennai.
3. S.Arumugam and S.Ramachandran.(2006). *Invitation to Graph Theory*. Sci Tech Publications (India) Pvt Ltd., Chennai

**Weblinks**

1. https://youtu.be/rowWM-MiiXU
2. https://youtu.be/fOyxWaOnrgl
3. https://youtu.be/pvLi1s7S0tk
4. https://youtu.be/Gxr3AT4NY 0
5. **https://youtu.be/xlbbefbYLzg**
6. **https://youtu.be/bORJkIBhfEM**
7. **https://youtu.be/s5KZw1EpBEo**

**Pedagogy**

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

**Course Designers**

1. Dr. V. Geetha
2. Dr. S. Sasikala

| Semester I | Internal Marks: 25 | | | External Marks:75 |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs / Week** | **CREDITS** |
| **22UCS1AC2/ 22UCA1AC2/ 22UIT1AC2** | **NUMERICAL ANALYSIS AND STATISTICS** | **ALLIED** | **4** | **3** |

## Course Objectives

- **Understand** the implementation of various methods of Numerical Analysis.
- **Organize** and **summarize** the statistical data.
- **Analyze** and **evaluate** the strengths of the conclusions based on data.

## Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Understand the list of basic ideas of Numerical Methods and Statistics. | K1, K2 |
| **CO2** | Solve the problems using various methods and also classify the given datas. | K2, K3 |
| **CO3** | Identify the conceptual collection and classification of variables. | K3 |
| **CO4** | Analyze the accuracy and graphical representation of statistical datas. | K4 |
| **CO5** | Support the implementation of numerical methods and statistical datas. | K4 |

## Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 |
| **CO3** | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| **CO4** | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 |

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Solution of Algebraic & Transcendental Equations:** Introduction – The Bisection Method – The Iteration Method – Newton-Raphson Method (Problems Only)<br>**Interpolation:** Finite Differences: Forward Differences, Backward Differences – Newton's Formulae for Interpolation – Interpolation with unevenly spaced Points: Lagrange's Interpolation formula | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| II | **Numerical Integration:** Numerical Integration: Simpson's 1/3-Rule – Simpson's 3/8-Rule (proof not needed).<br>**Linear Systems of Equations:** Solution of Linear Systems–Direct Methods: Gaussian Elimination Method – Solutions of Linear Systems – Iterative Methods (Problems Only) | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| III | **Numerical solution of Ordinary Differential Equations:** Introduction – Euler's Method – Modified Euler's Method – Runge-Kutta Methods – Predictor - Corrector Methods : Adams-Moulton Method | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| IV | **Measures of Central Tendency:** Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.<br>**Measures of Dispersion:** Mean Deviation – Standard Deviation (Simple Problems Only) | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Correlation:** Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson's co-efficient of Correlation – Rank Correlation: Spearman's Rank Correlation Coefficient (Derivation not needed and Simple Problems Only).<br>**Linear Regression:** Introduction – Linear Regression (Derivation not needed and Simple Problems Only) | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| VI | **Self Study for Enrichment:**<br>**(Not included for End Semester Examination)**<br>The method of False Position & Central Differences - Trapezoidal rule - Solution by Taylor's Series and Milne's Method - Range – Quartile Deviation - Rank Correlation (Repeated Ranks). | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

## Text Books

1. Sastry S. S. (1998). Introductory methods of Numerical Analysis, Third Edition. Prentice Hall of India Private Limited.

2. Gupta. S.C & Kapoor, V.K (2007). Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.

| | |
|---|---|
| UNIT – I | Chapter 2: Sections 2.1 - 2.3(Omit 2.3.1), 2.5(Omit 2.5.1) [1] |
| | Chapter 3: Sections 3.3 (Omit 3.3.4), 3.6, 3.9(3.9.1only) [1] |
| UNIT – II | Chapter 5: Sections 5.4(5.4.2 & 5.4.3 only) [1] |
| | Chapter 6: Sections 6.3(6.3.2 only) & 6.4 [1] |
| UNIT – III | Chapter 7: Sections 7.1, 7.4- 7.6 (Omit 7.4.1 & 7.6.2) [1] |
| UNIT – IV | Chapter 2: Sections 2.5 - 2.9, 2.13 (Omit 2.13.1 & 2.13.2) [2] |
| UNIT –V | Chapter 10: Sections 10.1 - 10.4, 10.7(10.7.1 Only) [2] |
| | Chapter 11: Sections 11.1 & 11.2 [2] |

## Reference Books

1. Jain M. K, Iyengar S. R.K. and Jain R.K. (1999). Numerical Analysis Numerical Methods for Scientific and Engineering Computations. New Age International Private Limited.

2. Froberg C.E. (1979). Introduction to Numerical Analysis. II Edition. Addison Wesley

## Web Links

1. **https://youtu.be/qCzUXav5Nk**
2. **https://youtu.be/r6MTvrI8SQ4**
3. **https://youtu.be/s05dONL4xAs**
4. **https://youtu.be/XaHFNhHfXwQ**
5. **https://youtu.be/zPG4NjIkCjc**

## Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

## Course Designers

1. Dr.R.Buvaneswari
2. Ms.A.Gowri Shankari

| Semester II | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT2CC2** | **DATA STRUCTURES & ALGORITHMS** | **CORE COURSE – II(CC)** | **5** | **5** |

**Course Objectives**

- To provide the knowledge of basic data structures and their implementations.
- To understand the importance of data structures in the context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

**Course Outcomes and Cognitive Level Mapping**

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Understand the abstract data types and basics of Algorithms | K1 |
| CO2 | Demonstrate the performance of basic linear and nonlinear data structures | K2 |
| CO3 | Implement the basic data structures and Algorithm design techniques | K3 |
| CO4 | Analyze the efficiency and proofs of correctness | K4 |
| CO5 | Assess, evaluate and choose appropriate data structure and algorithmic technique to solve real-world problems. | K5 |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **2** | **1** | **2** | **3** | **2** | **1** | **2** | **2** |
| **CO2** | **2** | **2** | **3** | **2** | **2** | **1** | **2** | **1** | **2** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **1** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**

**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | Introduction: Data structures-Abstract data types-What is an Algorithm?-Goal of the Analysis of Algorithms-Types of Analysis-Stacks: Stack - Stack ADT- Applications – Simple array Implementation-Problems and solution(Problem 2)- Queue: Queue ADT – Exceptions – Applications – Simple array Implementation-Problems and solutions(Problem 2) | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | Linked list: Introduction- Linked Lists ADT - Arrays overview - Singly Linked Lists - Doubly Linked Lists - Circular Linked Lists | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | Trees : Glossary - Binary Trees - Types of Binary Trees - Properties of Binary Trees - Binary Tree Traversals – Problems and Solutions(Problem 3).<br>Graphs: Introduction – Glossary - Applications of Graphs - Graph Representation- Graph Traversals - Topological Sort | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | Sorting and searching:Sorting definition-Classification of sorting algorithms-Bubble,Selection and Insertion sort-Searching Definition-Type of searching-Unordered and ordered Linear Search-Binary search | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | Algorithm design techniques-Greedy algorithm- Greedy strategy-Advantages and Disadvantages - Applications- Problems & Solutions(Problem 1-3)-Divide and Conquer: Introduction-strategy-Advantages and disadvantages-Applications-Problems and solutions(Problem 6) | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Reverse the elements of the stack using only stack operations(push &pop)-Implement one queue efficiently using two stacks- Perform polynomial addition using Linked list-Convert a tree to its mirror-Find shortest path- At a railway station for a schedule of trains arrival and departures find the minimum number of platforms so that all trains can be accommodated using Greedy algorithm | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

**Textbook**

1.Narasimha Karumanchi, N. (2017). Data structures and algorithms made easy,5th Edition, CareerMonk Publications.

**Reference Books**

**1.** T.H. Cormen, C.E. Leiserson, R.L. Rivest and C.Stein(2022), Introduction to Algorithms,4th Edition, MIT Press

2. ISRD Group, (2009). Data Structures Using, Tata McGraw Hill Education Pvt. Ltd, New Delhi.

3. Ellis Horowitz, Sartaj Sahni and Susan and Rewson-Freed(2008), Fundamentals of Data Structures in C,2nd Edition, Universities Press

**Web References**

1. https://www.geeksforgeeks.org/data-structures
2. https://www.tutorialspoint.com/data_structures_algorithms/index.html
3. https: ://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designer**

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.

| Semester II | Internal Mark: 40 | | External Mark: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT2CC2P** | **DATA STRUCTURES USING C (P)** | **CORE PRACTICAL – II (CP)** | **2** | **2** |

## Objectives

- To develop and execute C programs for various data structures
- To apply the knowledge of programming features
- To Implement various Algorithms

## Course Outcomes and Cognitive Level Mapping

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Recall program execution and Debugging | **K1** |
| **CO2** | Demonstrate the ideas of Data structures | **K2** |
| **CO3** | Make use of Operations of Linear and Non- linear data structures | **K3** |
| **CO4** | Develops the ability to analyze a problem and implement an algorithm to solve it. | **K4** |
| **CO5** | Acquire logical thinking, Identify the correct and efficient ways of solving problems | **K5** |

## Mapping with Programme Outcomes

| COs\POs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **2** | **1** | **2** | **3** | **2** | **1** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **1** | **2** | **3** | **2** | **2** | **2** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **2** | **2** | **2** | **3** | **3** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |

**Syllabus**

1. Stack implementation
2. Operations on Queue
3. Linked list
4. Binary tree traversal
5. Operations of Graph
6. Sorting
7. Searching
8. Greedy method
9. Divide and Conquer

**Course Designer**

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.

| Semester II | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT2CC3** | **DIGITAL FUNDAMENTALS** | **CORE COURSE –III(CC)** | **4** | **4** |

**COURSE OBJECTIVES**

- To provide knowledge on various number systems
- To inculcate the concepts of Boolean algebra
- To make the students learn combinational circuits
- To make the students learn combinational circuits

**COURSE OUTCOMES**

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| **CO1** | Understand the basics of digital logic | **K1** |
| **CO2** | Apply the conversion of number system | **K3** |
| **CO3** | Apply the Boolean algebra to generate digital circuits | **K3** |
| **CO4** | Design combinational circuits using gates | **K5** |
| **CO5** | Construct sequential circuits using registers | **K4** |

**Mapping with Programme Specific Outcomes and Programme Outcomes**

| COs\ PSOs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **3** | **2** | **3** | **2** | **2** | **2** | **3** | **2** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **3** | **2** | **2** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **NUMBER SYSTEMS AND CODES:**<br>Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Binary Addition and Subtraction – Binary subtraction by 1's and 2's complement – 9's and 10's complement Binary Multiplication and Division – Octal Numbers – Hexadecimal Numbers – Binary Codes – 8421 code - Error Detecting and Correcting Codes. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **BOOLEAN ALGEBRA AND LOGIC GATES:**<br>Boolean Algebra – Laws and Theorems – Minterms and Maxterms — DeMorgan's Theorems. Logic Gates: AND, OR, NOT, NAND,NOR and Exclusive OR Gates – Exclusive NOR Gate –Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB- Simplifying logic circuits- Sum of products and products of sum form | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **K MAP TECHNIQUES:**<br>Simplification of Boolean expression using Karnaugh Map with 2, 3 and 4 variables -Sum of Products - Product of Sum -– Don't Care Conditions – Overlapping Groups – Rolling the Map – Eliminating Redundant Group | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **COMBINATIONAL LOGIC CIRCUITS:**<br>Half and Full Adders – BCD Adder - Half and Full Subtractors – Multiplexers (4:1 line) – 1 to 4 line Demultiplexers – Decoders, Encoders | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | **SEQUENTIAL LOGIC CIRCUITS:**<br>Flip Flops – RS Flip Flop – Clocked RS Flip Flop – D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop – Clock – Counters and Shift Registers: Counters – Asynchronous or Ripple Counter – Ring Counter. Shift Registers. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment**<br>**Gray Code – Excess – 3 Code**<br>NAND and NOR Implementation — AND-OR-INVERT Implementation – OR-AND-INVERT Implementation - SISO – SIPO – PIPO – PISO | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

**Text Book**

Digital Logic and Computer Design. (2017). M. Morris Mano, India: Pearson India.

**Reference Books**

1. Principles of Digital Electronics, Dr. K. Meena, PHI Learning Private Limited, New Delhi, 2009.
2. Malvino and Leach –Digital Principles and Application, 2014

**Web References**

1. https://archive.org/details/digitalcomputerf00bart 9.
2. https://www.pdfdrive.com/digital-computer-fundamentals-computerarchitecture-e5719965.html
3. https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-spring-2015/resources/digital-logic/

**Course Designer**

**Dr. P. Tamilselvi, Associate Professor, Department of Information Technology**

| Semester II | Internal Marks:25 | | External Marks:75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UCS2AC3/ 22UCG2AC3/ 22UCA2AC3/ 22UIT2AC3/** | **OPERATIONS RESEARCH** | **ALLIED III** | **4** | **3** |

## Course Objectives

- **Understand** the various features of Operations research.
- **Analyze** the optimum solutions using Operations research.
- **Explore** the concepts of Operations research in real life problems.

## Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Define the various techniques of Operations research. | **K1** |
| **CO2** | Illustrate the various notions in the respective streams. | **K2** |
| **CO3** | Identify the different terminologies of Operations research | **K3** |
| **CO4** | Analyze the solutions of mathematical problem using specific techniques. | **K4** |
| **CO5** | Simplify the optimum solutions of a mathematical problem. | **K4** |

## Mapping of CO with PO and PSO

| Cos | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 |
| **CO2** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation –**

**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Operations Research**<br>Introduction-Origin and Development of O.R.- Nature and Features of O.R.- Scientific Method in O.R.- Modelling in Operations Research - Advantage and Limitation of Models- General Solution Methods for O.R. Models- Methodology of Operations Research- Operations Research and Decision Making<br>**Linear Programming Problem- Mathematical Formulation**<br>Introduction-Linear programming Problem- Mathematical Formulation of the problem -Illustrations on Mathematical Formulation of LPPs.(simple problems only)<br>**Linear programming problem-graphical Solution and Extension**<br>Introduction- Graphical Solution Method- General Linear Programming Problem- Canonical and Standard Forms of LPP. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| II | **Linear Programming Problem-Simplex Method**<br>Introduction-Fundamental Properties of Solutions- The computational Procedure- The Simplex Algorithm-Use of Artificial Variables-Big M method.(simple problems only). | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| III | **Transportation problem**<br>Introduction-LP Formulation of the Transportation Problem- Existence of Solution in T.P-TheTransportation Table-Loops in Transportation Table-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality-Economic interpretation of $u_j$'s and $v_j$'s - Degeneracy in Transportation Problem-Transportation Algorithm (MODI method), (simple problems only).<br>**Assignment Problem**<br>Introduction-Mathematical Formulation of the Problem- Solution Methods of Assignment Problem- Special Cases in Assignment Problems(simple problems only). | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| IV | **Sequencing problem**<br>Introduction-Problem of Sequencing-Basic Terms Used in Sequencing- Processing *n* Jobs through Two Machines- Processing *n* Jobs through *k* Machines(problems only). | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| V | **Network Scheduling by PERT/CPM**<br>Introduction- Network: Basic Components- Logical Sequencing- Rules of Network Construction- Concurrent Activities - Critical Path Analysis -Probability Considerations in PERT. | 12 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| VI | **Self-Study for Enrichment**<br>**(Not included for End Semester Examination)**<br>Application of Operations Research.<br>– Two-Phase method – The Travelling Salesman problem – Processing 2 Jobs through *k* Machines –.<br>Inventory Models(without shortage) | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

## Text Books

1. Kanti Swarup, P.K. Gupta, Manmohan.(2019). *Operations research, Sultan Chand Publications*.

## Chapters and Sections

| | | |
|---|---|---|
| UNIT–I | Chapter 1: | Sections 1:1 – 1:9 |
| | Chapter 2: | Sections 2:1 – 2:4 |
| | Chapter 3: | Sections 3:1 – 3:5 |
| UNIT II | Chapter 4: | Sections 4:1 – 4:4 |
| UNIT-III | Chapter 10: | Sections 10:1 – 10:3, 10:5, 10:6, 10:8 – 10:13 |
| | Chapter 11: | Sections 11:1 – 11:4 |
| UNIT-IV | Chapter 12: | Sections 12:1 – 12:5 |
| UNIT-V | Chapter 25: | Sections 25:1 – 25:7 |

## Reference Books


1. Hamdy A.Taha (2017),*Operations Research An Introduction*, Pearson India Education services PVT Ltd.
2. Premkumar Gupta, Hira D.S.(2004), *Operations Research*, S.Chand & Company Ltd, New Delhi.
3. Chandrasekhara Rao.K,Shanti Lata Mishra(2008), *Operations Research*, Narosa Publishing House PVT Ltd, New Delhi.


## Web References

1. **https://www.britannica.com/topic/operations-research**
2. **https://byjus.com/maths/linear-programming/**
3. **https://www.gatexplore.com/transportation-problem-study-notes/**
4. **https://youtu.be/rowWM-MijXU**
5. **https://youtu.be/TQvxWaQnrqI**
6. **https://youtu.be/RTX-ik_8i-k**
7. **https://youtu.be/s5KZw1EpBEo**

## Pedagogy

Power point presentation, Group discussion, Seminar, Assignment.

## Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

| Semester III | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT3CC4** | **Relational Database Management Systems** | **CORE COURSE – III (CC)** | **6** | **6** |

**Course Objectives**

- To provide a sound introduction to DBMS
- To present SQL and Procedural interfaces to SQL comprehensively
- To present the concepts and techniques related to query processing by SQL engines
- To provide an overview of the concepts of NoSQL

**Course Outcomes and Cognitive Level Mapping**

**On the successful completion of the course. students will be able to**

| CO Number | CO Statement | Knowledge level |
|---|---|---|
| CO1 | Outline the terminology, features, classifications, characteristics and benefits embodied in database systems | K1 |
| CO2 | Formulate using relational algebra solutions to a broad range of query problems | K2 |
| CO3 | Demonstrate a broad range of SQL query and its application | K3 |
| CO4 | Design an information model expressed in the form of an Entity relation diagram | K3 |
| CO5 | Apply normalization in relational database design and demonstrate PL/SQL program interfaces | K3 |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 |

**"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation "-" indicates there is no correlation.**

**SYLLABUS**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Introduction to Databases:** Databases and Database Users - Database System Concepts and Architecture- **Conceptual Data Modeling and Database Design** -Data Modeling Using the Entity–Relationship (ER) Model-The Enhanced Entity–Relationship (EER)- Subclasses, Superclasses, and Inheritance- Specialization and Generalization- Constraints and Characteristics of Specialization and Generalization Hierarchies | 18 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **The Relational Data Model and Relational Database Constraints** Relational Model Concepts -Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations -**The Relational Algebra and Relational Calculus**-Unary Relational Operations: SELECT and PROJECT-Relational Algebra Operations from Set Theory-Binary Relational Operations: JOIN and DIVISION - Additional Relational Operation. | 18 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **Basic SQL:** SQL Data Definition and Data Types - Specifying Constraints in SQL - Basic Retrieval Queries in SQL -INSERT, DELETE, and UPDATE Statements in SQL -Additional Features of SQL **More SQL:** Complex Queries, Triggers, Views and Schema Modification - More Complex SQL Retrieval Queries- Specifying Constraints as Assertions and Actions as Triggers -Views (Virtual Tables) in SQL -Schema Change Statements in SQL | 18 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **Database Design Theory and Normalization :** Basics of Functional Dependencies and Normalization for Relational Databases- Informal Design Guidelines for Relation Schemas- Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms - Boyce-Codd Normal Form-Multivalued Dependency and Fourth Normal Form -Join Dependencies and Fifth Normal Form **Relational Database Design Algorithms and Further Dependencies** **Further Topics in Functional Dependencies:** Inference Rules, Equivalence, and Minimal Cover - Properties of Relational Decompositions- Algorithms for Relational Database Schema Design - About Nulls, Dangling Tuples, and Alternative Relational Designs | 18 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | **PL/SQL Concepts:** Cursors, Stored Procedures, Stored Function, Database Triggers- **Introduction to NOSQL Systems** | 18 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

| | | | | |
|---|---|---|---|---|
| VI | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>• Design a ER model for Banking transactions<br>• Write query to Create schemas related to bank<br>• Normalize the schema with applying the normal forms<br>• Perform transactions such as Deposit, Withdraw using sub queries<br>• Apply PL/SQL concept to validate the data | - | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5 | K1,<br>K2,<br>K3,<br>K4,<br>K5 |

**Textbooks**

1. Elamsri and Navathe,(2016).Fundamentals of database systems, Pearson Education
2. Ivan Bayross ,SQL & PL/SQL, BPB publications.

**References**


1. C.J.Date,(2003). An Introduction To Database Systems, Pearson.
2. J.D.Ullaman,(2010).Principles of Database Systems, Mc-Graw Hill Education, Galgotia Publishers
3. Abraham Silberschatz, Henry F. Korth & S. Sudarshan (2011).Database System Concepts Mc-Graw Hill Education.


**Web References**

1. https://beginnersbook.com/2015/04/rdbms-concepts
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.tutorialspoint.com/dbms/

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designer**


1. Dr. S. Suguna Devi, Associate Professor, Department of Information Technology.

| Semester III | Internal Mark:40 | | External Mark: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT3CC3P** | **RDBMS(P)** | **CORE COURSE -III (CP)** | **3** | **3** |

## Course Objectives

- Creating and Altering Tables with necessary constraints, keys and data types
- Inserting data and manipulating data as per needs
- Writing SQL Queries to retrieve required information from single/multiple tables.
- Creating views and manipulating them as needed

## Course Outcomes

On the successful completion of the course, Students will be able to

| CO Number | CO Statement | Knowledge level |
|---|---|---|
| CO1 | Design and implement a database schema for a given problem | K1 |
| CO2 | Create and maintain tables using PL/SQL | K2 |
| CO3 | Populate and query a database | K3 |
| CO4 | Prepare reports | K3 |
| CO5 | Application development using PL/SQL | K3 |

## Course Outcomes and Cognitive Level Mapping

| COs\ POs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **1** | **3** | **3** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **1** | **3** | **3** |
| **CO3** | **3** | **2** | **2** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **3** | **3** | **3** | **2** | **3** | **3** | **2** | **2** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **3** | **3** |

## Syllabus

1. Draw ER diagram for Banking transaction

**Using MYSQL execute the following**

2. Creation of college database and establish relationships between tables
3. Create a view to extract details from two or more tables
4. To demonstrate Joins
5. To demonstrate Aggregate functions
6. To implement String functions.
7. To demonstrate various nested queries.

**With the help of PL/SQL**

8. Write a stored procedure and Function to process student's results.
9. Write a program to implement Trigger.
10. Write a program to generate employee pay slip using PL/SQL.

## Web References

https://www.w3schools.com/mysql/
https://towardsdatascience.com/practical-sql-create-and-query-a-relational-database-8bac84d78703

## Course Designer

1.Dr.S. Suguna Devi, Associate Professor, Department of Information Technology.

| Semester III | Internal Marks: 25 | | External Marks:75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **HRS /WEEK** | **CREDITS** |
| **22UITGEC1** | **WEB DESIGN** | **GEC** | **2** | **2** |

**Course Objectives**

- To get familiar of basics and commands of HTML
- To acquire knowledge and skills for creation of web page
- To gain ability to develop responsive web applications

**Course Outcomes**

On the successful completion of the course, students will be able to

| CO Number | CO Statements | Cognitive Level |
|---|---|---|
| CO1 | Understand the basic commands of HTML | K1 |
| CO2 | Illustrate the basic structure of HTML document and the methods to create, save and open it. | K2 |
| CO3 | Apply HTML commands to use various events and elements like Text, Media, Tables, Lists, Images in a web page | K3 |
| CO4 | Analyze the method of creating a web page with different events and elements including images and hyperlinks. | K4 |
| CO5 | Inspect a web page with various commands and interactive elements of HTML | K4 |

**Mapping of CO with PO and PSO**

| Cos | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |

**"1" - Slight (Low) Correlation** **"2" - Moderate (Medium) Correlation**
**"3" - Substantial (High) Correlation** **"-" – Indicates there is no Correlation**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| **I** | **Getting started with HTML 5**: Defining HTML Markup – Basic Structure of an HTML Document – Creating and Saving a HTML document – opening the HTML document in a web browser – Modifying the background of HTML web page. | **6** | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| **II** | **Introduction to New Elements in HTML 5:** The Markup Elements – The Media Elements – The Canvas Element – The Form Element - The Input Type Attributes Values – The Window Event Attributes – The Form Events – The Mouse Events – The Media Events. | **6** | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| **III** | **Working with Text:** Adding Plain Text to an HTML Web page – Adding Text in a New line – Creating Headings – Creating Paragraph – Creating Horizontal Rule –Creating Subscript and Superscript – Aligning, Formatting and Grouping the Text - **Working with Lists, Tables and Frames:** Working with Lists:- Unordered – Ordered – Definition Lists. | **6** | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| **IV** | **Working with Lists, Tables and Frames:** Working with Tables: Creation – Specifying a Caption to a Table – Adding Table Heading – Table Border – Aligning a Table and Cell content – Setting the Width of a Table and Table Columns – Changing the Background Color of a Table - Cell Padding – Cell Spacing – Spanning Rows and Columns. | **6** | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |
| **V** | **Working with Hyperlinks, Images and Multimedia**: – Hyper links: Creating a Hyperlink – Setting the Hyperlink Color – Linking different Sections of a Web page - Working with Images: Inserting an Image – Displaying Alternate Text from an Image – Aligning an Image – Using Images as Links – Image Maps. | **6** | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4 |

| | | | | |
|---|---|---|---|---|
| **VI** | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Internet, Uses of Internet, Web pages and Website. | - | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5 | K1,<br>K2,<br>K3,<br>K4 |

**Text Book**

1. Kogent Learning Solutions , *HTML 5 in Simple Steps*, Dream Tech Press, 2010

**Reference Book**

1. O. H. U. Heathcote, Basics Of Internet 3rd Edition; Payne Gallway Publisher Limited, 2003

**Web References**

- https://www.w3schools.com/html/
- https://www.tutorialspoint.com/html/index.htm

**Pedagogy**

Chalk and talk, Power Point Presentation, E-Content

**Course Designer**

Dr. S. Latha, Associate Professor, Department of Information Technology.

| Semester IV | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT4CC5** | **PROGRAMMING IN JAVA** | **CORE** | **6** | **6** |

## Course Objectives

- To develop logics which will help them to create programs
- To get a deep knowledge of programming using JAVA language
- To understand the basics of OOPs concepts
- Enhance problem solving skill

## Course Outcomes and Cognitive Level Mapping

**On the successful completion of the course, the students will be able to**

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Identify the basic elements of Java programming, principles of OOP and graphical user interface. | K1 |
| CO2 | Infer the program structure, syntax and semantics of the programming language and interactive environment. | K2 |
| CO3 | Analyze the variables, data types, OOPs concept, AWT package and database. | K4 |
| CO4 | Use the programming skills in OOPs, GUI programming and database connectivity in various domains. | K3 |
| CO5 | Solve the real time problems using object-oriented concepts, interactive environment and JDBC connectivity | K5 |

## Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **3** | **2** | **1** | **1** | **2** | **2** | **2** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **1** | **1** | **3** | **3** | **2** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **2** | **3** | **3** | **2** | **2** | **2** |
| **CO4** | **2** | **2** | **3** | **2** | **2** | **2** | **3** | **2** | **2** | **2** |
| **CO5** | **2** | **3** | **2** | **2** | **2** | **3** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no Correlation.**

## Syllabus

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Fundamentals of Object-Oriented Programming:** Basic Concepts of Object-Oriented Programming - Benefits and Applications of OOP. **Java Evolution:** Java Features - Java Environment - **Overview of Java Language:** Java Program Structures, Statements – Implementing A Java Program – Java Virtual Machine –. **Constants, Variables and Data Types:** Constants- Variables – Data Types – Declaration of Variables – Giving Values to Variables – Scope of Variables – Symbolic Constants- Type Casting- Getting Values of Variables. | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| II | **Operators and Expressions - Decision Making and Branching:** Introduction - Decision making with if statement-Simple if statement -The if-else Statement- Nesting of if …else statements- The switch statement - The Conditional Operator(?:Operator) -**Decision Making and Looping :** While, Do, For Statement, Jump In Loops, Return Statement. | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| III | **Classes, Objects and Methods**: Defining A Class – Fields and Methods Declaration - Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance**:** Extending A Class – Overriding Methods – Final Variables, Methods and Classes – Abstract Methods and Classes – Visibility Control. **Arrays, Strings**: Creating Arrays – One- and two-Dimensional Arrays - Strings. **Interfaces: Multiple Inheritance:** Introduction - Defining Interfaces - Extending Interfaces-Implementation Interfaces - Accessing Interfaces Variables. | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| IV | **Packages**: Introduction - Java Packages - Using System Packages- Naming conventions - Creating packages - Accessing a package - Using a Package - Adding a class to a package - **Multithreaded Programming:** Creating Threads – Extending the Thread Class – Thread- Life Cycle of Thread-Using Thread Method-Thread Priority – Synchronization – **Managing Errors and Exceptions:** Introduction - Types of Errors -Exceptions-Syntax of Exception Handling - Multiple Catch Statements. | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| V | **Graphics Programming using AWT, Swing and Layout Manager:** The Graphics Class- Lines and Rectangles- Circles and Ellipses-Drawing Arcs - Drawing Polygons – Introduction to AWT Package – Window Fundamentals – Layout Managers – Introduction to Swing Package – Components and Containers - **Database Connectivity**: Introduction – JDBC Architecture – Discussion with Example – Overview of JDBC Components. | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

| | | | | |
|---|---|---|---|---|
| VI | **Self Study for Enrichment**<br>**(Not to be included for External Examination)**<br>Comment Line Arguments – Enumerated Types - Finalizer Methods - **Applet Programming:** Building Applet Code - Applet Life Cycle - Creating and Executable Applet – Designing a Web Page using Applet – **Managing Input/ Output Files in Java:** Stream Classes – Byte Stream Classes – Character Stream Classes – Creation of Files – Reading/Writing Characters – Reading/Writing bytes. | - | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

**Text Book**

E. Balagurusamy,(2019). "*Programming with JAVA*", 6th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

**Reference Books**

1. S.Sagayaraj, R.Denis, P.Karthik and D.Gajalakshmi,(2017)."*Java programming*", Universities Press.
2. Herbert Schildt, (2011)."*Java :The Complete Reference*", 8th Edition Tata McGraw-Hill.
3. C.Muthu, (2008)."*Programming with JAVA*", Second Edition, McGraw Hill Education
4. Ken Arnold gosling and Davis Holmen, (2005). "*The JAVA Programming Language*",4th Edition, Addison Wesley Pearson Education Publication.

**Web References**

1. https://www.javatpoint.com/java-tutorial
2. https://www.guru99.com/java-tutorial.html
3. https://www.w3schools.com/java/

**NPTEL Online Courses**

https://onlinecourses.nptel.ac.in/noc22_cs47/preview

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designer**

Dr. A. BHUVANESWARI, Associate Professor, Department of Information Technology.

| Semester IV | Internal Marks:40 | | External Marks:60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **HOURS/WEEK** | **CREDITS** |
| **22UIT4CC4P** | **PROGRAMMING IN JAVA (P)** | **CORE** | **4** | **4** |

## Course Objectives

- To demonstrate the basic programming components of Java
- To learn how to apply the object oriented concepts in Java to develop stand-alone applications
- To design and develop GUI applications with appropriate database connectivity

## Course Outcomes and Cognitive Level Mapping

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Demonstrate and implement the fundamentals of Java programming concepts | K2, K3 |
| CO2 | Analyze the problem and develop skills on identifying appropriate programming constructs like looping, branching and functions | K3, K4 |
| CO3 | Examine the problem and create a reusable program by combining the features of Java such as Classes, Objects, Packages, Interfaces and Exception handling | K4, K6 |
| CO4 | Analyze the complexity of problem in real world and design an event driven and web based interactive programs using swing | K4, K6 |
| CO5 | Build applications with database connectivity to mimic the real world scenarios | K6 |

## Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **3** | **2** | **1** | **3** | **2** | **3** | **1** | **2** | **3** |
| **CO2** | **3** | **2** | **3** | **1** | **3** | **3** | **3** | **1** | **3** | **2** |
| **CO3** | **2** | **3** | **3** | **2** | **2** | **2** | **3** | **2** | **2** | **2** |
| **CO4** | **2** | **2** | **3** | **2** | **2** | **3** | **3** | **2** | **3** | **2** |
| **CO5** | **3** | **2** | **2** | **2** | **2** | **3** | **2** | **1** | **2** | **3** |

**"1"-Slight (Low) Correlation** **"2"–Moderate (Medium) Correlation**
**"3"-Substantial (High) Correlation** **"-"-indicates there is no Correlation.**

**Exercises**

1. Class and Objects
2. Constructor Overloading
3. Inheritance
4. String Manipulation
5. Interface
6. Package
7. Multithread
8. Exception Handling
9. GUI using Swing
10. Database Connectivity using JDBC

**Web References**

1. http://docs.oracle.com/javase/tutorial/java/
2. http://www.java2s.com/Tutorial/Java/CatalogJava.htm
3. http://www.javatpoint.com/java-swing
4. http://way2java.com/java-versions-2/jdk-1-8-features/
5. https://www.w3schools.com/java/
6. https://www.tutorialspoint.com/java/

**Pedagogy**

Power Point Presentations, Demo by Virtual Labs, e-Contents tutorials

**Course Designer**

Dr. A. BHUVANESWARI, Associate Professor, Department of Information Technology.

## COURSE OBJECTIVES

| Semester - IV | Internal Marks: 40 | | External Marks: 60 | |
|---|---|---|---|---|
| **Course Code** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT4GEC2P** | **WEB DESIGN (P)** | **Generic Elective Course- II (GEC)** | **2** | **2** |

- To get familiar with commands of HTML
- To develop a web page with Table, Frames and Links
- To create a form with user interaction
- To handle embedding audio and video in HTML

## COURSE OUTCOMES

**On the successful completion of the course, students will be able to**

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Develop a simple web page using basic HTML tags | K1 |
| CO2 | Create many frames and link them in HTML | K2 |
| CO3 | Design a web page using Tables | K3 |
| CO4 | Embed audio and video in HTML | K4 |
| CO5 | Recommend a form with user interaction | K5 |

## MAPPING OF CO WITH PO AND PSO

| COs | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

"1" - Slight (Low) Correlation "2" - Moderate (Medium) Correlation
"3" - Substantial (High) Correlation "-" – Indicates there is no Correlation

## SYLLABUS

1. Handling different tags available in HTML
2. Create an advertisement in HTML with images and link multiple documents
3. Prepare a Time Table for your class using TABLE tag
4. Create a number of framesets and jump to a specific section within a frame
5. Develop a web page using different types of lists in HTML
6. Embedding audio and video in HTML documents
7. Create an application form for a job (use Text box, Check box, Buttons…)

## COURSE DESIGNER

Dr. S. LATHA, Associate Professor, Department of Information Technology

| Semester - IV | Internal Marks: 40 | | External Marks: 60 | |
|---|---|---|---|---|
| **Course Code** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT4SEC1P** | **PC Packages (P)** | **Skill Enhancement Course-I (SEC)** | **2** | **2** |

**COURSE OBJECTIVES**

- To implement various features of MS word
- To learn about MS Excel and its various Applications
- To create e-content using power point presentation

**COURSE OUTCOMES**

**On the successful completion of the course, students will be able to**

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Show various formatting operations in MSWord | K1 |
| CO2 | Create multiple documents using Mail merge | K2 |
| CO3 | Design a table and implement various operations | K2 |
| CO4 | Apply various operation and charts in MS-Excel | K3 |
| CO5 | Make use of power point features to create E content | K3 |

**Mapping of CO with PO and PSO**

| COs | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

**"1" - Slight (Low) Correlation** **"2" - Moderate (Medium) Correlation**
**"3" - Substantial (High) Correlation** **"-" – Indicates there is no Correlation**

## SYLLABUS

### MS WORD

1. Create a document and perform the following operations.
   To count the occurrences of the word, find and replace a particular word, set the autocorrect entry and apply various formatting operations
2. Create student table and perform the operation such as Insertion, Deletion, alignment, splitting, merging of cells, sorting and apply autosum formulas.
3. Use Mailmerge concept to create multiple letters
4. Create Table of contents, bibliography and bookmarks.

### MS-EXCEL

1. Create a student table for five subjects
   1. Compute the total marks and percentage of each student by entering the appropriate formula.
   2. Compute the grades
   3. Find the maximum and minimum percentage
   4. Generate a column chart to compare data

2. A company records the details of total sales (in Rs.) sector wise and month wise
   1. Using appropriate formula, calculate total sale for each sector
   2. Create a 3-D column chart to show sector wise data for all four months
   3. Create a 3-D pie chart to show sales in Jan in all sectors

3. Create employee paybill for two years with following details
   1. To calculate the total salary as sum of Basic Salary, HRA and DA for each employee for the year 1997.
   2. To calculate the total salary of each employee for the year 1998 as sum of salary for the year 1997 and bonus. Also calculate the percentage increase in the total salary from 1997 to 1998 for each employee.
   3. Create a Bar chart to compare the two years

### MS–POWER POINT

1. Design a Birthday Invitation card with music.
2. Design a cover for a book a theme for the page, picture or clipart and Use WordArt
3. Design a poster with customized page set up inviting all students of your department to the IT Fest.
4. Create a 5-slide presentation on any topic. Use Images, Graphs, Chart, Tables, Animation, Time, Bullets, Transition, Sound, Hyperlink, Background template, Header and Footer.
5. Record Audio to the above presentation and convert it to video file

## Web References

**https://www.javatpoint.com/ms-word-tutorial**
**https://www.tutorialspoint.com/mastering-microsoft-office-2021-365-word-excel-powerpoint/index.asp**
**https://www.oakland.edu/Assets/Oakland/grad/files-and-documents/Thesis-Dissertations/Microsoft-Office-Tutorials/Microsoft%20Office%20Tutorials.pdf**

## Course Designer

1. Dr. S. Suguna Devi, Associate professor, Department of Information Technology

| Semester V | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5CC6/ 22UCS5CC6** | **OPERATING SYSTEMS** | **CORE COURSE – (CC)** | **6** | **6** |

## Course Objectives

- To understand the basic concepts of operating system
- To know the responsibilities of the operating system
- To get in depth knowledge of various scheduling algorithm for efficient resource management
- To acquire the knowledge of file management

## Course Outcomes and Cognitive Level Mapping

**On the successful completion of the course, the students will be able to**

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Understand the conceptual view of Operating systems | K1,K2 |
| CO2 | Comprehend how an operating system provides an abstracted interface to the hardware resources | K3 |
| CO3 | Apply various scheduling algorithms for efficient resource utilization. | K3 |
| CO4 | Analyze the role of synchronization to improve system performance | K4 |
| CO5 | Implement the functionalities pertaining with process, File and I/O Management. | K5 |

## Mapping of CO with PO and PSO

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **2** | **3** | **3** | **2** | **3** | **3** | **1** | **3** | **3** |
| **CO2** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **1** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **3** | **2** | **2** | **3** | **2** | **3** |
| **CO4** | **3** | **2** | **2** | **3** | **3** | **3** | **2** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**SYLLABUS**

| Unit | CONTENT | HOURS | Cos | COGNITIVE LEVEL |
|---|---|---|---|---|
| **I** | **Introduction to Operating System:** Operating System-Operating System Software -A Brief History of Machine Hardware -Types of Operating Systems -Brief History of Operating System Development Object-Oriented Design of Operating System | **16** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **II** | **Memory Management:** Early Systems: Single-User Contiguous Scheme -Fixed Partitions-Dynamic Partitions- Best-Fit versus First-Fit Allocation -Deallocation - Relocatable Dynamic Partitions. **Virtual Memory:** Paged Memory Allocation-Demand Paging-Page Replacement Policies and Concepts - Segmented Memory Allocation-Segmented/Demand Paged Memory Allocation – **Virtual Memory – Cache Memory** | **20** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **III** | **Processor Management:** Overview-About Multi-Core Technologies-Job Scheduling Versus Process Scheduling-Process Scheduler-Process Scheduling Policies-Process Scheduling Algorithms – Interrupts **Deadlock**-Seven Cases of Deadlock -Conditions for Deadlock-Modeling Deadlock- Strategies for Handling Deadlocks –Starvation | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **IV** | **Concurrent Processes:** What is Parallel Processing? – Introduction to Multicore processors – Typical Multiprocessor configuration **– Process Synchronization Software**<br>**Device Management:** Types of Devices-Sequential Access Storage Media-Direct Access Storage Devices- Magnetic Disk Drive Access Times | **20** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **V** | **File Management:** The File Manager -Interacting with the File Manager - File Organization - Physical Storage Allocation -Access Methods-Levels in a File Management System - Access Control Verification Module –Data Compression | **16** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **VI** | **Self-Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>OS Design Considerations for Multiprocessor and Multicore – Windows, Unix and Linux Installation- 7 UNIX SVR4 Process Management, Buddy System, – Windows 7 Thread and SMP Management - Linux Process and Thread Management -Traditional UNIX Scheduling – Windows File system – Linux File system | | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

## Textbook

1. Understanding Operating Systems (2017), Ann McIver McHoes, Ida M. Flynn, 8th Edition,Course Technology, Cengage Learning

## References


1. Operating Systems Internals and Design Principles (2018), William Stallings, 9th Edition, Prentice Hall,
2. Andrew S.Tanenebaum (2011), Operating Systems and Design Implementation, 3rd Edition, Pearson Education
3. Abraham Silberschatz , Perter Baer Galvin, Greg, (2010), Operating System Concepts, 8th Edition John Wiley & Sons.


## Web References

1. https://www.geeksforgeeks.org/what-is-an-operating-system
2. https://www.gatevidyalay.com/operating-system/
3. https://www.javatpoint.com/operating-system

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

## Course Designers


1. Dr. P.Tamilselvi, Associate professor, Department of Information Technology

| Semester V | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5CC7** | **Programming in Python** | **CORE COURSE (CC)** | **6** | **6** |

**Course Objectives**

- To understand the fundamentals of Python programming
- To demonstrate the usage of Arrays, Functions, Input and Output statements
- To develop programs with GUI and Regular expressions
- To create files and handle Exceptions

**Course Outcomes and Cognitive Level Mapping**

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | To define the basics of Python | K1 |
| CO2 | To explain the data types, Arrays, Regular expressions and Functions in Python | K2 |
| CO3 | To interpret the usage of Operators, Decision making, Control statements and File handling in Python | K3 |
| CO4 | To analyze the importance of Exception Handling in Python | K4 |
| CO5 | To evaluate the usage of modules and packages in Python | K5 |

**Mapping of CO with PO and PSO**

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **3** | **2** | **1** | **3** | **3** | **2** | **2** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **1** | **1** | **3** | **3** | **2** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **2** | **3** | **2** | **2** | **3** | **2** |
| **CO4** | **3** | **2** | **3** | **2** | **1** | **3** | **3** | **2** | **3** | **2** |
| **CO5** | **3** | **3** | **3** | **1** | **2** | **2** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no Correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Introduction to Python:** Features of Python - How to run Python - Basics of Python - Input, Output and Import Functions – Operators – **Data Types and Operations**: Numbers – Strings – List – Tuple – Set – Dictionary – Mutable and Immutable Objects – Data Type Conversion - **Flow Control:** Decision Making – Loops – Nested Loops – Control Statements – Types of Loops – List, Set and Dictionary Comprehensions – Nested Dictionaries | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| II | **Arrays:** Creating an Array – Indexing and Slicing – Types – Numpy arrays – Attributes of an Array **–** The reshape() Method – The Flatten Method() **–** Working with Multi-dimensional arrays – Indexing and slicing in multi-dimensional arrays – Matrices in Numpy – Random Numbers - Strings and Characters | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| III | **Functions:** Function Definition and Calling – Function Arguments – Anonymous Functions – Recursive Functions – Function with more than one return value – **Modules and Packages:** Built-in Modules – Creating Modules – Import Statement – Locating Modules – Namespaces and Scope – The dir() function – The reload() function – Packages in Python – Date and Time Modules | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| IV | **File Handling:** Opening, Closing, Writing, Renaming, Deleting and Reading from a File – File Methods – Directories in Python – **Exceptions:** Errors in a Python Program – Exceptions – Exception Handling – Types of Exceptions – The Except Block – The assert statement – User-Defined Exceptions – Logging the Exceptions | 10 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| V | Regular Expressions: The match() and search() function - Search and Replace – Regular Expressions Modifiers and Patterns – Character and Special Character Classes – Repetition Cases – findall() and compile( ) method – GUI Programming: Introduction – Tkinter - Widgets – Layout Managers | 18 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| VI | Self-Study for Enrichment<br>(Not to be included for External Examination)<br>Function Decorators, Strings and characters, Features of OOPS, Data Structures in Python and Networking in Python | - | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

**Text Books**

1. Jeeva Jose, ”Taming Python by Programming”, 2019, Khanna Book Publishing Co. (P) Ltd
2. Dr. R. Nageswara Rao, “Core Python Programming”, 2018, Dreamtech Press

**Reference Books**

1. Johannes Ernesti, Peter Kaiser “Python 3: The Comprehensive Guide”, 2022, SAP Press
2. Sakis Kasampalis Quan Nguyen Dr Gabriele Lanaro Dr. Gabriele Lanaro “Advanced Python Programming”, 2019, Packt

**Weblinks and Video Lectures (e-Resources)**

1. https://www.youtube.com/watch?v=rfscVS0vtbw
2. https://www.youtube.com/watch?v=jcQnTwjjtXM
3. https://www.youtube.com/watch?v=DmHSwTiD5Tk
4. https://www.youtube.com/watch?v=-_uNayxaQoU

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designer**

Dr. M. Thangam, Associate Professor, Department of Information Technology

| Semester V | Internal Marks: 40 | | External Marks: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5CC5P** | **Programming in Python (P)** | **Core Practical** | **4** | **4** |

**COURSE OBJECTIVES**

- To understand and implement Python programs
- To inculcate hands-on experience in developing Python programs
- To perform file operations and exception handling in Python

**COURSE OUTCOMES**

**On the successful completion of the course, students will be able to**

| CO Number | COURSE STATEMENT | Knowledge Level |
|---|---|---|
| CO1 | Develop simple programs in Python using data types and variables | K1 |
| CO2 | Demonstrate the concepts of Arrays, Functions and Strings | K2 |
| CO3 | Make use of Regular Expressions and Exception handling | K3 |
| CO4 | Analyze the usage of Files and its manipulations | K4 |
| CO5 | Evaluate the programs using GUI implementations | K5 |

**Mapping of CO with PO and PSO**

| COs | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

**"1" - Slight (Low) Correlation** **"2" - Moderate (Medium) Correlation**
**"3" - Substantial (High) Correlation** **"-" – Indicates there is no Correlation**

**LIST OF EXERCISES**

1. Simple programs in Python
2. Data types and Operations
3. Array Manipulations
4. Programs using Functions
5. Handling Strings
6. Programs using Lists, Tuples and Dictionaries
7. Executing Regular Expressions in Python
8. GUI programs
9. File Handling

**Course Designer**

Dr. M. Thangam, Associate Professor, Department of Information Technology

| Semester V | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5CC8** | **SOFTWARE ENGINEERING** | **CORE** | **5** | **5** |

**COURSE OBJECTIVES**

- The course is intended to influence the knowledge on constructing reliable software products.
- It also highlights several software testing to improve the quality of the software.

**COURSE OUTCOMES**

The successful completion of the course will equip the students to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Outline the progression in software and software engineering practice. | K1 |
| CO2 | Categorize the development phases and life cycle models of a project. | K2 |
| CO3 | Build the model in software project design and quality. | K3 |
| CO4 | Analyze the Software Engineering Process and types of testing | K4 |
| CO5 | Explain the Process Models, Design concepts and Testing approaches | K5 |

**Mapping with Programme Outcomes**

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **3** | **2** | **3** | **3** | **3** | **2** | **2** | **1** | **3** | **2** |
| CO2 | **3** | **3** | **3** | **2** | **3** | **2** | **2** | **1** | **2** | **2** |
| CO3 | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **2** | **3** | **3** |
| CO4 | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **3** |
| CO5 | **3** | **2** | **3** | **3** | **3** | **3** | **3** | **2** | **3** | **3** |

**"1" - Slight (Low) Correlation** **"2" - Moderate (Medium) Correlation**
**"3" - Substantial (High) Correlation** **"-" – Indicates there is no Correlation**

**SYLLABUS**

| Unit | CONTENT | HOURS | Cos | COGNITIVE LEVEL |
|---|---|---|---|---|
| **I** | **Software and Software Engineering:** The Nature of Software - The Unique Nature of WebApps – Software Engineering – The Software Process - Software engineering practice - Software myth | **15** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **II** | **The Software Process: Process Models**: Generic process model- Prescriptive process models **Requirements Modeling** - Requirements Analysis: Requirement Modeling Approaches – Data Modeling concepts - Class based modeling -Flow Oriented Modeling | **15** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **III** | **Design concepts:** Design within the context of software engineering - The Design Process - Design Concepts - The Design model – **Component Level Design:** Designing Class-Based Components**- Quality concepts**- What is Quality? - Software Quality: McCall's Quality Factors - Achieving Software Quality | **15** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **IV** | **Testing Approaches**: Software Testing Fundamentals - **Types of Testing**: White Box Testing - Static Testing- Structural Testing - Black Box Testing: What is Black Box testing – How to do? **Integration Testing:** Integration Testing- Integration Testing as Type of Testing. **System and Acceptance Testing:** System Testing Overview- Functional testing versus Non- functional Testing- Functional testing - Non-functional Testing – Acceptance Testing | **15** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **V** | **Performance Testing**: Factors governing Performance testing- Regression Testing: What is **Regression testing**- Types of Regression Testing - Best Practices in Regression Testing. **Internationalization Testing:** Primer on Internationalization - Test Phase for Internationalization – Internationalization Validation – Fake Language Testing – Language Testing – Localization Testing - **Ad-hoc Testing**: Overview – Buddy Testing – Pair Testing - Exploratory Testing – Iterative Testing – Defect Seeding. | **15** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **VI** | **Self-Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Agile Process and Agile Process Models – Requirements modelling for Web Apps – Testing Web Applications. | | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

## Textbooks

1. Roger S. Pressman, 2010, Software Engineering: A Practitioner's Approach, 7th Edition , McGraw-Hill Education **(Unit 1,2,3)**
2. Srinivasan Desikan, Gopalaswamy Ramesh (2012), Software Testing Principles and Practices, Pearson Education. **(Unit 4,5)**

## References

1. Ian Somerville (2010), Software Engineering, 7th Edition, Pearson Education
2. Paul C. Jorgensen (2010), Software Testing: A Craftsman's Approach, Fourth Edition, 4th Edition Auerbach Publications.
3. Naresh Chauhan (2012), Software Testing- Principles and Practices, Oxford University Press

## Web References

1. https://scai.engineering.asu.edu/wp-content/uploads/sites/31/2022/10/22-23-SoftwareEngineeringHandbookPublish.pdf
2. https://www.open.edu/openlearn/science-maths-technology/approaches-software-development/content-section---references
3. https://www.tutorialspoint.com/software-testing-complete-reference/index.asp
4. https://www.javatpoint.com/software-testing-tools

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

## Course Designer

1. Dr. S. Latha, Associate Professor, Department of Information Technology.

| Semester V | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5DSE1A** | **Mobile Application Development** | **Discipline Specific Elective – I (DSE)** | **5** | **4** |

**COURSE OBJECTIVES**

This course explores the knowledge over Mobile Application Development with its framework, layouts, intents and database connectivity

**COURSE OUTCOMES**

**On the successful completion of the course, students will be able to**

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Choose the development framework and the need for mobile applications | K1 |
| CO2 | Demonstrate the activity and intent usage | K2 |
| CO3 | Design applications with intents and broadcast receivers. | K3 |
| CO4 | Compile an application with database connectivity | K4 |
| CO5 | Develop real time applications to improvise user experience | K5 |

**Mapping of CO with PO and PSO**

| COs | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PO 1 | PO2 | PO 3 | PO4 |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **3** | **2** | **1** | **1** | **2** | **2** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **1** | **1** | **3** | **3** | **2** | **3** |
| **CO3** | **3** | **3** | **3** | **2** | **2** | **3** | **3** | **2** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **2** | **3** | **3** | **2** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **2** | **3** | **3** | **2** | **2** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**

**"3" – Substantial (High) Correlation** **"-" indicates there is no Correlation.**

**SYLLABUS**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Getting Started with Android Programming**<br>Introduction to Android – Obtaining the Required Tools – Launching your First Android Application - Using Android Studio for Android Development – Activities, Fragments and Intents. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| II | **Getting to Know the Android User Interface**<br>Understanding the Components of a Screen – Designing User Interface with Views: Basic Views – Displaying Pictures and Menus with Views. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| III | **Data Persistence and Content Providers**<br>Saving and Loading User Preferences – Persisting Data to Files – Creating and Using Databases. Content Providers: Sharing Data in Android – Using a Content Provider. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| IV | **Messaging and Location Based Services**<br>Messaging: SMS Messaging – Sending Email. Location Based Services: Displaying Maps – Getting Location Data - Monitoring Location | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| V | **Networking and Developing Android Services**<br>Networking: Developing Android Services: Creating your own services - Establishing Communication between a Service and an Activity - Binding Activities to Services – Understanding Threading. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| VI | Self Study for Enrichment<br>(Not to be included for External Examination)<br>Develop a App for maintaining the Home security<br>Develop an App to monitor the health related activity of an individual<br>Create a Tutorial mobile app for a subject | - | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

**TEXT BOOK**

**J. E. DiMarzio(**2017),"Beginning Android Programming with Android Studio",4th Edition, John Wiley & Sons

**REFERENCE BOOKS**

1. Reto Meier(2012),"Professional Android Application Development",Wiley
2. Charlie Collins, Michael Galpin and Matthias Kappler((2012),"Android in Practice", DreamTech

**WEB REFERENCES**

1. https://www.tutorialspoint.com/android/index.htm
2. https://www.geeksforgeeks.org/android-tutorial/
3. https://www.javatpoint.com/android-tutorial
4. http://developer.android.com/develop/index.html

**COURSE DESIGNER**

Dr. S. Suguna Devi, Associate professor, Department of Information Technology

| Semester V | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs / Week** | **CREDITS** |
| **22UIT5DSE1B** | **B. Big Data Analytics** | **Discipline Specific Elective –I (DSE)** | **5** | **4** |

## COURSE OBJECTIVES

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Understand Map Reduce Jobs
- Provide hands on Hadoop Eco System
- Apply analytics on Structured, Unstructured Data

## COURSE OUTCOMES AND COGNITIVE LEVEL MAPPING

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Identify Big Data and its Business Implications | K1 |
| CO2 | List the components of Hadoop and Hadoop Eco-System | K2 |
| CO3 | Access and Process Data on Distributed File System | K\3 |
| CO4 | Manage Job Execution in Hadoop Environment | K4 |
| CO5 | Develop Big Data Solutions using Hadoop Eco System | K5 |

## Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **3** | **2** | **1** | **3** | **3** | **2** | **2** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **1** | **1** | **3** | **3** | **2** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **2** | **3** | **2** | **2** | **3** | **2** |
| **CO4** | **3** | **2** | **3** | **2** | **1** | **3** | **3** | **2** | **3** | **2** |
| **CO5** | **3** | **3** | **3** | **1** | **2** | **2** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no Correlation**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Introduction to Big data analytics**: Need of Big data-Classification of Data - Structures, Semi-structured and unstructured - Big data definitions - Characteristics-Data type - Big data Classifications - Big data handling techniques - Defining data architecture-Data Sources, Quality, Preprocessing and storing- Data storage and analysis – Big data analytics applications and case studies. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| II | **Hadoop:** Hadoop and its ecosystem-Hadoop distributed File system – Map reduce Framework and Programming model - Hadoop YARN-Hadoop ecosystem tools. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| III | **NoSQL Big data Management:** NoSQL datastore -NoSQL data Architecture patterns - NoSQL to manage Big data – shared – Nothing Architecture for big data tasks- MongoDB Database-Cassendra databases. | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| IV | **MapReduce , Hive and Pig :** MapReduce, Map tasks, Reduce Tasks and MapReduce execution - Composing MapReduce for calculations and algorithms -HIVE - HIVEQL - Pig | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| V | **Spark and Big data Analytics:** Spark-Introduction to data analytics with Spark - Downloading Spark and programming using RDDS and MLIB – Data ETL – Introduction to analytics, Reporting and visualizing | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| VI | Self Study for Enrichment (Not to be included for External Examination)<br>**Programming Examples in Analytics and Machine Learning using Hadoop, Spark and Python** : Installation Steps for Hadoop and Spark - Installation Steps for Hadoop, Hive and Pig - Installation Steps for the Spark on Ubuntu - Computing Platform Configuration - Datasets Used in the Examples, Data Deployment and Exploration - Counting and Sorting of Items in Datasets using MapReduce - Storing CSV Dataset into Hive Database Storing CSV Dataset into the Spark DataFrame -Merge and Join Functions for DataFrame Objects -Analysis and Query-Processing Using UDFs in Hive and Pyspark - Data Visualization using Python Plotting Library | - | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

**Text Book**

1. Raj Kamal, Preeti Saxena(2019),” Big Data Analytics, Introduction to Hadoop, Spark, and Machine-Learning”, McGraw-Hill Education

**Reference Books**

1. Tom White(2015), “Hadoop: The Definitive Guide”, 4 th Edition, O‟Reilly Media, ISBN-13: 978-9352130672
2. Boris Lublinsky, Kevin T Smith, Alexey Yakubovich, "Professional Hadoop Solutions", 1st Edition, Wrox Press, 2014ISBN-13: 978-8126551071
3. Eric Sammer(2012), "Hadoop Operations: A Guide for Developers and Administrators", 1st Edition, O'Reilly Media,.ISBN-13: 978-9350239261
4. ArshdeepBahga(2018), Vijay Madisetti, "Big Data Analytics: A Hands-On Approach", 1st Edition, VPT Publications, 2018. ISBN-13: 978-0996025577

**Weblinks and Video Lectures (e-Resources)**

1. https://www.youtube.com/watch?v=n_Krer6YWY4
2. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
3. https://www.digimat.in/nptel/courses/video/106104189/L01.html

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designer**

Dr. J. SANGEETHA, Associate Professor, Department of Information Technology.

| Semester V | Internal Marks: 25 | | External Marks: 75 | |
|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | CATEGORY | Hrs/Week | CREDITS |
| 22UIT5DSE1C | Cloud Computing | Discipline Specific Elective – I (DSE) | 5 | 4 |

## Course Objectives

- To learn about the basic concepts in Cloud Computing
- To know about Cloud infrastructure mechanisms and cloud service management
- To describe the cloud computing architecture design principles
- To understand the role of virtualization in building an efficient cloud architecture
- To identify and discuss cloud security threats

## Course Outcomes and Cognitive Level Mapping

| CO Number | Course Outcome | Cognitive Level |
|---|---|---|
| CO1 | To define the core concepts of cloud computing paradigm, characteristics, advantages, challenges and threats from various cloud computing models and services | K1 |
| CO2 | To identify the cloud computing, models, services, techniques and applications with different cloud architectures | K2 |
| CO3 | To apply the fundamental concepts of Virtualization in cloud and discuss its types and usage with different cloud models and services | K3 |
| CO4 | To analyze the performance of cloud computing with cloud security issues in recent technologies and platforms | K4 |
| CO5 | To summarize the importance of cloud computing models, services, usage of virtualization with cloud security issues | K5 |

## Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 1 | 3 | 3 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 1 | 1 | 3 | 3 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 3 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 3 |

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no Correlation

**SYLLABUS**

| UNIT | CONTENT | HRS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Foundation of Cloud Computing**: Introduction – History – Fundamentals of Cloud Computing Ecosystem – Cloud computing characteristics – Advantages and disadvantages of cloud computing – Comparison of traditional and cloud computing paradigms – **Cloud Services and Deployment Models:** Cloud Deployment Models – Cloud Service Models – Cloud infrastructure mechanisms – Cloud Service Management | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| II | **Cloud Computing Architecture:** Design principles – Cloud Computing Life Cycle (CLCC) – Cloud Computing Reference Architecture – Load balancing approach – Mobile Cloud Computing (MCC) – **Virtualization Technology –** Understanding and adopting Virtualization – Techniques of Virtualization – How virtualization works? – XEN, Kernel-based Virtual Machine (KVM), VMware, VirtualBox, Citrix – Types of Virtualization – Virtualization in Cloud | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| III | **Cloud Security and Privacy:** Cloud Security – Cloud CIA security model – Cloud computing security architecture – Data Security in the Cloud: Challenges with Cloud Data – Data Confidentiality and Encryption – Data Availability – Data Integrity – Cloud Data Management Interface – Cloud Service Gateways (CSG) – Cloud Firewall – Virtual Firewall | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| IV | **Cloud Computing Service Level Agreements and Applications:** Service Level Agreements (SLA) practices – Components of a cloud SLA – Types of SLAs – **Cloud Computing Applications:** Introduction – Google App Engine – Google Apps – Google Cloud Datastore – Dropbox Cloud – Apple iCloud – Microsoft Windows Azure Cloud – Amazon Web Services (AWS) | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| V | **Cloud Computing Technologies, Platforms and Services:** High Performance computing with cloud technologies – Message Passing Interface (MPI) – MapReduce programming model – Dryad and Dryad LINQ – Eucalyptus cloud platform and its components – Open Nebula cloud platform- Features and Layers – OpenStack cloud platform- components and benefits – Nimbus cloud computing platform and its features – Apache Hadoop ecosystem – Architecture and components – Hadoop and cloud | 15 | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| VI | Self Study for Enrichment<br>(Not to be included for External Examination)<br>Security issues in virtualization – Service Oriented Architecture – Legal issues in cloud computing – Cloud computing certifications – Factors affecting cloud computing adoption | - | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |

## Text Books

1. Kamal Kant Hiran, Ruchi Dishi, Temitayo Fagbola, Mehul Mahrishi, “Cloud Computing”, 2019, BPB Publications
2. Kailash Jayaswal, Jagannath Kallkurchi, Donald J. Houde, Dr. Deven Shah, “Cloud Computing Black Book”, 2015, DreamTech Press

## Reference Books

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, “**Cloud Computing – A Practical Approach**”, McGraw Hill Education, 2017
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, “**Cloud Computing – Principles and Paradigms**, 2013, Wiley Publications
3. Dan C. Marinescu, “**Cloud Computing – Theory and Practice**”, Second Edition, Elsevier, 2019

## Weblinks and Video Lectures (e-Resources)

1. https://k21academy.com/cloud-blogs/cloud-computing-deployment-models/
2. https://www.mygreatlearning.com/blog/virtualization-in-cloud-computing/
3. https://www.simplilearn.com/applications-of-cloud-computing-article
4. https://www.youtube.com/watch?v=-8O32k26RWA
5. https://www.youtube.com/watch?v=RWgW-CgdIk0

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar

## Course Designer

Dr. M. Thangam, Associate Professor, Department of Information Technology.

| Semester V | Internal Marks: 40 | | External Marks: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT5SEC2P** | **Cloud Computing (P)** | **Skill Enhancement Course – II(SEC)** | **2** | **2** |

**COURSE OBJECTIVES**

- To install and create Virtual Machines in Workstation Player
- To apply the knowledge of how to Install and Upgrade VMware Tools
- To implement how to configure various Virtual Machine Hardware Settings
- To implement file transfer from host machines to guest machines

**COURSE OUTCOMES**

**On the successful completion of the course, students will be able to**

| CO Number | COURSE STATEMENT | Knowledge Level |
|---|---|---|
| CO1 | Mention the steps to install and create Virtual Machines | K1 |
| CO2 | Demonstrate the workstation Player Preference settings | K2 |
| CO3 | Apply the knowledge to install, upgrade and configure on VMware tools | K3 |
| CO4 | Examine the knowledge on Virtual Machines | K4 |
| CO5 | Implement file transfer from host to guest machines | K5 |

**Mapping of CO with PO and PSO**

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

"1" - Slight (Low) Correlation "2" - Moderate (Medium) Correlation
"3" - Substantial (High) Correlation "-" – Indicates there is no Correlation

**LIST OF EXERCISES**

1. Creating Virtual Machines in Workstation Player
2. Changing Workstation Player Color Theme Settings
3. Installing and Upgrading VMware Tools
4. Configure VMware Tools Updates for a Specific Virtual Machine
5. Changing the Display Settings for a Virtual Machine
6. Change the Name, Working Directory, VM Directory and Memory Allocation for a Virtual Machine
7. Configuring and Managing devices like Keyboard, CD-ROM, Floppy Drives
8. Configuring Network Connections
9. Configuring Virtual Machine Hardware Settings
10. Implement File transfer from host to guest machines

**Course Designer**

Dr. M. Thangam, Associate Professor, Department of Information Technology.

| SEMESTER - VI | Internal Mark - 25 | | External Mark-75 | |
|---|---|---|---|---|
| **Course Code** | **Course Title** | **Category** | **Hours/Week** | **Credits** |
| **22UIT6CC9** | **Computer Networks** | **Core Course IX(CC)** | **6** | **6** |

**Course Objectives**

- To understand the fundamentals of networking concepts
- To develop deeper insights of various network architectures
- To learn and familiarize about various network paradigm protocols

**Course Outcome**

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Understand the basic concepts of reference models and identify the functionality of different layers in computer communications | **K1, K2** |
| **CO2** | Implement error detection and correction mechanisms at the data link layer. | **K3** |
| **CO3** | Design and implement IP addressing schemes and routing protocols in network layer | **K4, K5** |
| **CO4** | Acquire practical knowledge of application layer protocols and their functionalities | **K3** |
| **CO5** | Apply the acquired knowledge and skills in real-world networking scenarios | **K3** |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **3** |
| **CO2** | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **2** | **3** | **3** |
| **CO3** | 3 | **2** | **3** | **3** | **3** | **3** | **2** | **3** | **2** | **3** |
| **CO4** | **3** | **3** | **3** | **2** | **3** | **2** | **3** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **2** | **3** | **2** | **3** | **3** |

**"1" – Slight (Low) Correlation** **2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| **I** | **Introduction:** Data Communications-Networks -Network Types **– Network Models –** Protocol Layering – TCP/IP Protocol Suite – OSI Model | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **II** | **Bandwidth Utilization : Multiplexing - FDM - WDM - TDM - Transmission Media:** Guided Media – Unguided Media – **Switching –** Circuit-Switched Networks – Packet Switching - **Structure of a Switch** | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **III** | **Data Link Layer : Introduction – Link Layer Addressing :** Three Types of Address -Address Resolution Protocol – **Error Detection and Correction – Introduction -** Block coding **– Cyclic Codes –** Cyclic Redundancy Check **– Check sum – Concept – Forward Error Correction - Data Link Control : DLC Services – Data Link Layer Protocols** | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **IV** | **Network Layer : Network-Layer Services** – Packetizing – Routing and Forwarding –**Packet Switching –Network Layer Performance - IPV4 address –** Address space – Classful addressing – Classless Addressing –**Unicast Routing –** Routing Algorithms | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **V** | **Introduction to Transport Layer:** Transport Layer Services – **Transport Layer Protocols – User Datagram Protocol -Transmission Control Protocol- Application Layer –** Providing Services – Application Layer Paradigms – **Standard client Server protocols** – World Wide Web and HTTP – FTP – Electronic Mail – Domain Name System | **18** | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3<br>K4<br>K5 |
| **VI** | **Self Study for Enrichment (Not included for End Semester Examinations)**<br>Bluetooth-Cellular Telephony - Satellite Networks -IPv6 - Routing algorithms Cryptography: Introduction-Symmetric-Key | | | |

**Text Books**

1. Behrouz A. Forouzan (2017), “Data communication and Networking”,5th Edition, Tata McGraw-Hill.

**Reference Books**

1. James F. Kurose and Keith W. Ross (2012), “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education.
2. Larry L.Peterson and Peter S. Davie (2012), “Computer Networks”, Fifth Edition, Harcourt Asia Pvt. Ltd., Second Edition, Publishers.
3. Andrew S. Tanenbaum (2012), “Computer Networks”, 5th Edition, Pearson 2012.
4. William Stallings (2007), “Data and Computer Communication”, Sixth Edition, Pearson Education

**Web References**

1. https://onlinecourses.nptel.ac.in/noc22_ee61/preview
2. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
3. https://www.studytonight.com/computer-networks/reference-models-in-computer-networks

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

**Course Designers**

Dr. P. Tamilselvi, Associate Professor, Department of Information Technology.

| Semester VI | Internal Mark: 25 | | External Mark: 75 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT6CC10** | **WEB TECHNOLOGIES** | **CORE X** | **5** | **5** |

## Course Objectives

- To understand the fundamentals of HTML5
- To get the deep knowledge of HTML5 and CSS
- To develop logics using JavaScript with jQuery to create programs and applications in HTML5
- Enhance skill on problem solving by constructing algorithms

## Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Define the basic concepts of HTML5, CSS, jQuery and PHP | K1 |
| CO2 | Illustrate the usage of new elements and application of CSS with HTML5 | K2 |
| CO3 | Build JavaScript Objects and jQuery methods to access HTML attributes | K3 |
| CO4 | Apply the knowledge of programming concepts to develop programs | K4 |
| CO5 | Solve real time problems using Web Technologies | K5 |

## Mapping of CO with PO and PSO

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | **2** | **3** | **2** | **1** | **2** | **2** | **2** | **3** | **2** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **3** | **2** | **2** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** | **2** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**

**3" – Substantial (High) Correlation** **"-" indicates there is no correlation**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Overview of HTML5 and Other Web Technologies:** Introduction to HTML, JavaScript, CSS, PHP – Exploring New Features of HTML5 – Structuring an HTML Document – Exploring editors and browsers supported by HTML5 – Creating, Validating, Viewing and Saving an HTML document – **Fundamentals of HTML**: Understanding elements – Describing Data Types – Working with Text – Organizing Text in HTML – Working with Links and URLs (75) | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **HTML5 and CSS:** Creating Tables – Working with Images, Colors and Canvas – Working with Forms – Interactive Elements – Working with Multimedia **– CSS:** Overview – Backgrounds and Color Gradients – Fonts and Text Styles – Creating Boxes and Columns – Displaying, Positioning and Floating an Element – Table Layouts – Pseudo-Classes and Pseudo-Elements - Responsive web design | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **Introduction to JavaScript and jQuery :** Exploring Features, Programming Fundamentals and using JavaScript in HTML Document – JavaScript Functions, Events, Image Maps and Animations – JavaScript Objects – Working with Browser Objects – Validation, Errors, Debugging, Exception Handling and Security – **Overview of jQuery :** Fundamentals – Selectors – Methods to access HTML Attributes – Methods for Traversing – Manipulators – Events and Effects | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **Fundamentals of PHP :** Introduction – Types of Information, Variables and Constants, Statements and Expressions – for each statement - Functions - Strings and Arrays | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | **PHP Files:** File and Directory Management – Cookies, Session variables and Server variables – Building and Handling Forms in PHP – User Authentication - Database Connectivity using MySQL | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Introduction to Web – Internet Basics – Internet Protocols – Hypertext and Hyperlinks - Web Browsers – Scripting Languages, PHP Operators, Control Structures – Looping and Branching | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

**Textbook**

1. DT Editorial Services (2016). HTML5 Black Book , 2nd Edition, Dream Tech Press, New Delhi.
2. Marty Matthews. (2015). PHP and MYSQL Web Development, Tata McGraw Hill.
3. Steve Suehring, Tim Converse, Joyce Park (2013). PHP6 and MySQL Bible, Wiley

**References**

1. DT Editorial Services (2015). HTML5 in Simple Steps, 2nd Edition, Dreamtech Press, New Delhi
2. Ben Frain (2020). Responsive Web design with HTML5 and CSS, 3rd Edition, Packt Publishing Ltd. UK
3. Robin Nixon (2018). Learning PHP, MySQL & JavaScript 5e: With jQuery, CSS & HTML5, 5th Edition, O'Reilly Publication

**Web References**

1. https://www.tutorialspoint.com/html5/index.htm
2. https://www.codecademy.com/learn/introduction-to-javascript
3. http://www.bsourcecode.com/php/basic-concepts/

**Pedagogy**

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar

**Course Designers**

1. Dr. M. Thangam, Associate Professor, Department of Information Technology

| Semester VI | Internal Mark: 40 | | External Mark: 60 | |
|---|---|---|---|---|
| **COURSE CODE** | **COURSE TITLE** | **CATEGORY** | **Hrs/Week** | **CREDITS** |
| **22UIT6CC6P** | **WEB TECHNOLOGIES (P)** | **CORE PRACTICAL VI** | **3** | **3** |

## Objectives

- To inculcate the basics of HTML5 programs using JavaScript and PHP
- To enable the students to learn and write programs using Web Technologies
- To implement the knowledge of CSS, Selectors and Event Handlers

## Course Outcomes and Cognitive Level Mapping

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Recall program execution and Debugging | **K1** |
| **CO2** | Demonstrate the ideas of applying styles | **K2** |
| **CO3** | Make use of event handlers | **K3** |
| **CO4** | Develop the ability to analyze and design a web page | **K4** |
| **CO5** | Acquire logical thinking to solve real-time problems | **K5** |

## Mapping with Programme Outcomes

| COs\ POs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **1** | **2** | **3** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** | **2** | **2** | **2** | **3** |
| **CO3** | **3** | **2** | **2** | **2** | **2** | **3** | **3** | **2** | **3** | **2** |
| **CO4** | **3** | **3** | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **2** | **3** |

## Syllabus

1. Programs using HTML5 and CSS
   a) Formatting text
   b) Creating and linking CSS file
   c) Creating Lists and Tables
   d) Displaying Images and Forms
   e) Working with Multimedia and Interactive Elements
2. Programs using JavaScript and jQuery
   a) Incorporating Script element in HTML
   b) Working with Image Maps and Animations
   c) Executing Event Handlers
   d) Applying jQuery Selectors
3. Programs using PHP
   a) Simple Programs
   b) Implementing Server Variables
   c) PHP programs to access a database
4. Case Study

| SEMESTER - VI | Internal Mark - 25 | | External Mark-75 | |
|---|---|---|---|---|
| **Course Code** | **Course Title** | **Category** | **Hours/Week** | **Credits** |
| **22UIT6DSE2A** | **Internet of Things** | **Discipline Specific Elective - II(DSE)** | **5** | **4** |

**Course Objectives**

- To comprehend the foundational principles of the Internet of Things (IoT) and its applications
- To obtain understanding of IoT protocols and layered architecture
- To acquire the knowledge on data analysis and cloud storage in the context of IoT

**Course Outcomes and Cognitive Level Mapping**

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | State the basics of IoT and layered architecture | K1 |
| **CO2** | Understand general concepts of Internet of Things (IoT) also recognize various devices, sensors and applications | K2 |
| **CO3** | Implement the layered architecture and protocol architecture of IoT | K3 |
| **CO4** | Examine the data and cloud storage model | K4 |
| **CO5** | Design the real time data analysis using Hadoop | K5 |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **3** | **2** | **2** | **3** | **3** | **3** | **2** | **3** |
| **CO2** | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **3** | **3** | **3** | **3** | **2** | **3** | **2** | **2** |
| **CO4** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **2** | **3** | **2** |
| **CO5** | **2** | **2** | **2** | **2** | **2** | **2** | **3** | **2** | **3** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**

**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | **Introduction to IoT**: Definition and Characteristics of IoT - Physical Design of IoT: Things in IoT - IoT Protocols - Logical Design of IoT: Function blocks - Communication Models - Communication APIs - IoT Enabled Technologies - IoT Levels and Deployment Templates. **Domain Specific IoTs:** Home Automation, Cities, Environment, Agriculture, Industry, Health and Lifestyle**.** | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | **IoT and M2M:** M2M - Difference between IoT and M2M - Software Defined Networks - Network Function virtualization - **IoT System Management with NETCONF–YANG:** Need for IoT systems management - SNMP - Network Operator requirements - IoT systems management<br>**Developing IoT:** IoT Design Methodology-Case study on IoT for Weather Monitoring | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | **Sensors, Participatory Sensing, RFIDs:** Introduction – Sensor Technology – Participatory Sensing, Industrial IoT and Automotive IoT – Actuator – Sensor Data Communication Protocols, RFID.<br>**Protocols for IoT:** Layered Architecture for IoT – Protocol Architecture of IoT – IEEE802.15.4 – 6LoWPAN – Bluetooth Low Energy – Z-Wave – ZigBee. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | **IoT Physical Devices and Endpoints:** Building blocks of an IoT Device, Exemplary device: Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces - Serial, SPI, I2C, Programming Raspberry Pi with Python - Other IoT Devices.<br>**Platform:** IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models – WAMP for IoT – Xively Cloud for IoT. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie – Apache Spark – Apache Storm – Using Apache Storm for Real-time data analysis. Tools for IoT: Introduction – Chef – Chef case studies. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| VI | **Self Study for Enrichment**<br>**(Not included for End Semester Examinations)**<br>Applications of IoT: Energy, Retail, Logistics, Case Studies Illustrating IoT Design: - Home Automation – Cities – Environment – Agriculture – Productivity Applications. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

## Textbooks

1. Internet of Things – A Hands-on Approach – Arshdeep Bahga, Vijay Madisetti – University Press (India) Pvt. Ltd., 2015
2. Internet of Things Architecture and Design Principles – Raj Kamal – McGraw Hill Education (India) Private Limited, 2017
3. The Internet of Things, Enabling Technologies, Platforms, and Use Cases – Pethuru Raj and Anupama C. Raman – CRC Press Taylor & Francis - 2017

## References

1. Waltenegus Dargie, Christian Poellabauer (2010), "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley-A Wiley and Sons, Ltd., Publications
2. Francis DaCosta (2013), "Rethinking the internet of things-A scalable approach to connecting everything", Apress Open Publications.
3.Peter Waher (2015), "Learning Internet of Things", PACKT Publishing-Birmingham-Mumbai.

## Web References

NPTEL & MOOC course titled Introduction to Internet of Things

https://onlinecourses.nptel.ac.in/noc22_cs53/preview

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

## Course Designers

Dr. A. Bhuvaneswari, Associate Professor, Department of Information Technology.

| SEMESTER - VI | Internal Mark - 25 | | External Mark-75 | |
|---|---|---|---|---|
| Course Code | Course Title | Category | Hours/Week | Credits |
| 22UIT6DSE2B | C# PROGRAMMING | Discipline Specific Elective - II(DSE) | 5 | 4 |

**Course Objectives**

- To understand C# language constructs, syntax and semantics.
- To obtain a deep knowledge of C# language and enable the students to write interactive program.
- To implement Object-Oriented Programming concepts and database connectivity using C#

**Course Outcomes and Cognitive Level Mapping**

On the successful completion of the course, the students will be able to

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| CO1 | Understand the basic concepts of C# program | K1 |
| CO2 | Apply object oriented programming principles | K2 |
| CO3 | Implement Exception handling mechanism | K3 |
| CO4 | Interact with databases using C# | K4 |
| CO5 | Create dynamic web applications | K5 |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 |
| CO2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 |
| CO3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 |
| CO4 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**

**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

## Syllabus

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | Introducing C#- C#'s Defining Features-Visual Studio-Anatomy of a Simple Program-. Basic Coding in C# | 13 | CO1, CO2, CO3, CO4, CO5 | K1, K2 K3, K4, K5 |
| II | Generics-Generic Types-Constraints-Zero like values-Generic methods-Collections-Arrays-Array Initialization-Variable Argument Count with the params Keyword-List-List and Sequence Interfaces-Implementing Lists and Sequences-Collection-Dictionaries-Sets-Queues and Stacks-Linked Lists-Concurrent Collections | 17 | CO1, CO2, CO3, CO4, CO5 | K1, K2 K3, K4, K5 |
| III | Inheritance-Inheritance and Conversions-Interface Inheritance-Generics-System. Object-Virtual Methods-Sealed Methods and Classes-Accessing Base Members-Inheritance and Construction-Object Lifetime | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2 K3, K4, K5 |
| IV | Exceptions-Delegates, Lambdas, and Events-Delegate Types-Inline Methods-Events | 17 | CO1, CO2, CO3, CO4, CO5 | K1, K2 K3, K4, K5 |
| V | Files and Streams-Multithreading-. Asynchronous Language Features | 13 | CO1, CO2, CO3, CO4, CO5 | K1, K2 K3, K4, K5 |
| VI | Self Study for Enrichment (Not included for End Semester Examinations) LINQ-. Reactive Extensions-XAML | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

## Textbooks

1.Ian Griffiths(2022) Programming C# 10.0,O'Reilly

## References


1. Christian Nagel, Jay Glynn, Morgan Skinner(2014),Professional C# 5.0 and .NET 4.5.1, Wiley
2. John Paul Mueller, Bill Sempf ,C# 7.0 All-in-One For Dummies,Wiley


## Web References

https://www.javatpoint.com/c-sharp-tutorial
https://dotnettutorials.net/lesson/csharp-7-new-features/

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

## Course Designers


Dr. S.Suguna Devi, Associate Professor, Department of Information Technology.

| SEMESTER - VI | Internal Mark - 25 | | External Mark-75 | |
|---|---|---|---|---|
| **Course Code** | **Course Title** | **Category** | **Hours/Week** | **Credits** |
| **22UIT6DSE2C** | **ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS** | **Discipline Specific Elective - II(DSE)** | **5** | **4** |

**Course Objectives**

- Discuss the issues and techniques involved in the creation of intelligent systems.
- To analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.

**Course Outcomes and Cognitive Level Mapping**

**On the successful completion of the course, the students will be able to**

| CO Number | CO Statement | Cognitive Level |
|---|---|---|
| **CO1** | Design user interfaces to improve human–AI interaction and real time decision-making. Evaluate the advantages, disadvantages, challenges, and ramifications of human–AI augmentation. | K1 |
| **CO2** | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning | K2 |
| **CO3** | Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. | K3 |
| **CO4** | Extract information from text automatically using concepts and methods from natural deduction | K4 |
| **CO5** | Compare the Procedural Versus Declarative knowledge, forward and backward reasoning and Matching by Representing the knowledge using Rules | K5 |

**Mapping of CO with PO and PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **3** | **2** | **2** | **3** | **3** | **3** | **2** | **3** |
| **CO2** | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **3** | **3** | **3** | **3** | **2** | **3** | **2** | **2** |
| **CO4** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **2** | **3** | **2** |
| **CO5** | **2** | **2** | **2** | **2** | **2** | **2** | **3** | **2** | **3** | **3** |

**"1" – Slight (Low) Correlation** **"2" – Moderate (Medium) Correlation**
**"3" – Substantial (High) Correlation** **"-" indicates there is no correlation.**

**Syllabus**

| UNIT | CONTENT | HOURS | COs | COGNITIVE LEVEL |
|---|---|---|---|---|
| I | Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search. | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| II | Heuristic Search techniques: Generate and Test – Hill Climbing – Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis. | 13 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| III | Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem | 16 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| IV | Using Predicate Logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction | 16 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |
| V | Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert Systems Definition-Characteristics-architecture- Knowledge Engineering-Expert System Life Cycle-Knowledge Acquisition Strategies- Expert System Tools | 15 | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

| | | | | |
|---|---|---|---|---|
| VI | Self Study for Enrichment<br>(Not included for End Semester Examinations)<br>Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking.<br>PROLOG-The Natural Language of AI: Prolog facts and rules, variables, control structures, arithmetic operators, matching in Prolog, backtracking. | - | CO1, CO2, CO3, CO4, CO5 | K1, K2, K3, K4, K5 |

## Textbooks

1. Elaine rich,Kevin Knight,Shivashankar B Nair (2017). Artificial Intelligence, Cengage Learning India.

## References

1.Saroj Kaushik(2012),Artificial Intelligence,Cengage Learning India
2.Mishra R.B,(2010),An Approach to Knowledge Base Management,Prentice Hall of India

## Web References

NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems
https://nptel.ac.in/courses/106106140/
https://nptel.ac.in/courses/106106126/

## Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

## Course Designers

Dr. J Sangeetha, Associate Professor, Department of Information Technology.

| SEMESTER - VI | Internal Mark - 25 | | External Mark-75 | |
|---|---|---|---|---|
| **Course Code** | **Course Title** | **Category** | **Hours/Week** | **Credits** |
| **22UIT6PW** | **Project Work** | **Project Work** | **5** | **4** |

**SYLLABUS**

## Course Objectives

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical and logical skills for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.

**On the successful completion of the course, the students will be able to**

- Identify and formulate the problem
- Analyze the problem and collect necessary data.
- Design and develop the project using appropriate software by applying the programming skills.
- Implement, evaluate and generate reports

**There shall be six components that will be considered in assessing a project work with weightage as indicated. Based on the 6 components internal mark can be awarded**

- Submission of the assigned tasks during Periodical review
- Individual involvement, teamwork and adoption of industry work culture
- Quality of project documentation (Precision, stylistics etc)
- Accomplishment of project deliverables
- Effective technical presentation of project work
- Viva-Voce

**External Assessment**

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exams. The board of examiners shall award 100 marks based on the following components.

- Achievement of project deliverables
- Effective technical presentation of project work
- Project Viva`