



**An Autonomous Institute**  
Shree Warana Vibhag Shikshan Mandal's  
**Tatyasaheb Kore Institute of  
Engineering And Technology,  
Warananagar**

# Department of Computer Science & Engineering

**Second Year  
Bachelor of Technology (B. Tech)  
in  
Computer Science & Engineering**

**S.Y.B.Tech. (Sem-III) Computer Science & Engineering  
Syllabus Structure and Curriculum as per NEP 2020**

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Department of Computer Science & Engineering

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## Vision

To become center of excellence in the field of Computer Science and Engineering and develop competent IT technocrats

## Mission

- To develop engineering graduates with high degree of professional excellence
- To excel in academics and research through contemporary and real world problems
- To enhance graduate employability through work based learning in social entrepreneurship
- To encourage industrial and nationally recognized institutes collaboration
- To create an environment to nurture lifelong learning

## Program Educational Objectives (PEOs)

### Graduates will be,

- Able to design and develop computing system using modern technologies by adapting business intelligence and challenges.
- Able to acquire capabilities with aptitude for higher education and entrepreneurship
- Able to function effectively as professionals having excellent interpersonal skills with ethical and social obligations.
- Able to work efficiently in multidisciplinary and multicultural environment
- Able to lead in their respective domain and contribute positively to the needs of society.

## Program Specific Outcomes (PEOs)

### Graduate will be able to

- Identify, design and develop solution for real world problems by implementing phases of software development process model
- Analyze and apply the computer science engineering solutions in societal and human context
- Demonstrate the skills and knowledge of contemporary issues in the field of Computer science and Engineering

## Quality Policy

- To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.

**SWVSM'S**  
**Tatyasaheb Kore Institute of Engineering and Technology, Warananagar**  
**An Autonomous Institute**

**Abbreviations**

| S N | Acronym | Definition                         |
|-----|---------|------------------------------------|
| 1   | ISE     | In-Semester Examination            |
| 2   | ESE     | End-Semester Examination           |
| 3   | ISA     | In-Semester Assessment (Term Work) |
| 4   | L       | Lecture                            |
| 5   | T       | Tutorial                           |
| 6   | P       | Practical                          |
| 7   | CH      | Contact Hours                      |
| 8   | C       | Credits                            |

**Course Bucket Terminologies**

| Sr. No. | Acronym | Definition                               |
|---------|---------|--|
| 1       | PCC     | Professional Core Course                 |
| 2       | MDM     | Multidisciplinary Minor                  |
| 3       | OE      | Open Elective Course                     |
| 4       | HSSM    | Humanities Social Science and Management |
| 5       | ELC     | Experiential Learning Course             |
| 6       | VSEC    | Vocational and Skill Enhancement Course  |
| 7       | AEC     | Ability Enhancement Course               |

**Course/ Subject Code**

| F.Y.B.Tech<br>Syllabus<br>change year | UG/PG | Course<br>Category<br>with<br>number | Separator | Branch | Semester | Course<br>Number |   |
|---------------------------------------|-------|--------------------------------------|-----------|--------|----------|------------------|---|
| 23                                    | UG    | PCC                                  | -         | CSE    | 3        | 0                | 1 |

**Course Term work and POE Code**

| CSE    | 3        | 0             | 1 | T / P / A                                    |
|--------|----------|---------------|---|--|
| Branch | Semester | Course Number |   | T - Term work<br>P - POE<br>A - Audit Course |

**Second Year B.Tech**  
(Semester-IV)  
in  
**Computer Science and Engineering**  
Syllabus Structure and Curriculum  
as per NEP 2020



SWVSM's  
**Tatyasaheb Kore Institute of Engineering and  
Technology (Autonomous), Warananagar**  
**Second Year B. Tech. (Computer Science and Engineering)**  
**Semester-IV**  
(To be implemented from 2024 - 25)  
**Credit Scheme as per NEP**

| Sr. No | Category                                 | Sub-Category                                 | Course Code   | Course Title  | Teaching Scheme |           |           |          |           | Examination & Evaluation Scheme |            |                 |           |
|--------|--|--|---|---|-----------------|-----------|-----------|----------|-----------|---------------------------------|------------|-----------------|-----------|
|        |  |  |   |   | L               | T         | P         | C        | CH        | Component                       | Marks      | Min for Passing |           |
| 1      | Program Core Courses                     | PCC  | 23UG-PCC-CSE401   | <a href="#">Automata Theory</a>   | 2               | --        | --        | 2        | 2         | ISE                             | 40         | 16              | 40        |
|        |  |  |   |   |                 |           |           |          |           | ESE                             | 60         | 24              |           |
| 2      |  | PCC  | 23UG-PCC-CSE402   | <a href="#">Operating System</a>  | 2               | --        | --        | 2        | 2         | ISE                             | 40         | 16              | 40        |
|        |  |  |   |   |                 |           |           |          |           | ESE                             | 60         | 24              |           |
| 3      | PCC                                      | 23UG-PCC-CSE403                              | <a href="#">Computer Networks</a>                           | 3   | --              | --        | 2         | 3        | ISE       | 40                              | 16         | 40              |           |
|        |  |  |   |   |                 |           |           |          | ESE       | 60                              | 24         |                 |           |
| 4      | PCC                                      | 23UG-PCC-CSE404                              | <a href="#">Computer Organization &amp; Microcontroller</a> | 3   | --              | --        | 2         | 3        | ISE       | 40                              | 16         | 40              |           |
|        |  |  |   |   |                 |           |           |          | ESE       | 60                              | 24         |                 |           |
| 5      | Multi-disciplinary Courses               | MDM-2  | 23UG-MDM2-CSE405  | <a href="#">Data Analytics with R/Python</a>  | 2               | --        | --        | 2        | 2         | ISA (TW)                        | 50         | 20              | 20        |
| 6      |  | OE-1   | 23UG-OE1-CSE406-1   | <a href="#">Internet of Things</a>  | 3               | --        | --        | 3        | 3         | ISE                             | 40         | 16              | 40        |
|        |  |  |   |   |                 |           |           |          | ESE       | 60                              | 24         |                 |           |
| 7      | Skill Course                             | Vocational & Skill Enhancement Course (VSEC) | 23UG-VSEC-CSE407P   | <a href="#">Python Programming</a>  | 2**             | --        | 4         | 2        | 6         | ISA                             | 25         | 10              | 30        |
|        |  |  |   |   |                 |           |           |          |           | ESE (POE)                       | 50         | 20              |           |
| 8      | Humanities Social Science and Management | Ability Enhancement Course (AEC-2)           | 23UG-AEC2-CSE408-1  | <a href="#">Modern Indian Languages: Marathi</a>                                      | 2               | --        | --        | 2        | 2         | ISA (TW)                        | 25         | 10              | 10        |
| 9      |  | Entrepreneurship/ Economics/ Mgmt. Course    | 23UG-EEC2-CSE409-1P   | <a href="#">Soft Skills</a>   | --              | --        | 2         | 1        | 2         | ISA (TW)                        | 25         | 10              | 10        |
| 10     |  | Value Education Course                       | 23UG-VEC2-CSE410-1P   | <a href="#">Designing The Digital Solution for Society Problems (Mini Project- I)</a> | 1               | --        | 2         | 2        | 3         | ISA (TW)                        | 25         | 10              | 20        |
|        |  |  |   |   |                 |           |           |          | ESE (POE) | 25                              | 10         |                 |           |
| 11     | Program Core Courses                     | PCC  | 23UG-PCC-CSE403P  | <a href="#">Computer Networks Lab</a>   | --              | --        | 2         | 1        | 2         | ISA (TW)                        | 25         | 10              | 30        |
|        |  |  |   |   |                 |           |           |          |           | ESE (POE)                       | 50         | 20              |           |
| 12     | Audit Course                             | Audit-3                                      | 23UG-A-CSE411   | <a href="#">Environment Studies</a>   | --              | --        | --        | --       | --        | --                              | --         | --              | --        |
|        |  |  |   |   | <b>20</b>       | <b>--</b> | <b>10</b> | <b>1</b> | <b>30</b> | <b>--</b>                       | <b>800</b> | <b>320</b>      | <b>30</b> |

**Note :** (1) \*\*Additional contact hours are provided for the courses without any credit  
(2) In theory examination there will be separate passing for ESE and ISE



| <b>Open Elective I<br/>Course Basket Sem – IV</b> |                     |                    |                       |
|---|---------------------|--------------------|-----------------------|
| <b>Open Elective -1</b>                           |                     |                    |                       |
| <b>Category</b>                                   | <b>Sub Category</b> | <b>Course Code</b> | <b>Name of Course</b> |
| Multidisciplinary Courses                         | OE-1                | 23UG-OE1-CSE406-1  | Internet of Things    |
|   |                     | 23UG-OE1-CSE406-2  | Soft Computing        |

| <b>Humanities Social Science and Management (HSSM)<br/>Course Basket Sem -IV</b> |                     |                    |                       |
|--|---------------------|--------------------|-----------------------|
| <b>Ability Enhancement Course (AEC-2)</b>  |                     |                    |                       |
| <b>Category</b>  | <b>Sub Category</b> | <b>Course Code</b> | <b>Name of Course</b> |
| Humanities Social Science and Management   | AEC -2              | 23UG-AEC2-CSE408-1 | Marathi               |
|  |                     | 23UG-AEC2-CSE408-2 | Hindi                 |
|  |                     | 23UG-AEC2-CSE408-3 | Kannada               |

| <b>Entrepreneurship / Economics Course (EEC-2)</b> |                     |                     |   |
|--|---------------------|---------------------|---|
| <b>Category</b>                                    | <b>Sub Category</b> | <b>Course Code</b>  | <b>Name of Course</b>                           |
| Humanities Social Science and Management           | EEC – 2             | 23UG-EEC2-CSE409-1P | Soft Skills                                     |
|  |                     | 23UG-EEC2-CSE409-2P | Professional Skills for Workplace               |
|  |                     | 23UG-EEC2-CSE409-3P | Stress Management, Adaptability and Flexibility |

| <b>Value Education Course (VEC-2)</b>    |                     |                     |  |
|--|---------------------|---------------------|--|
| <b>Category</b>                          | <b>Sub Category</b> | <b>Course Code</b>  | <b>Name of Course</b>  |
| Humanities Social Science and Management | VEC-2               | 23UG-VEC2-CSE410-1P | Designing The Digital Solution For Society Problems (Mini Project I) |
|  |                     | 23UG-VEC2-CSE410-2P | Cyber Security and Privacy   |



|  |  |                     |                                     |
|--|--|---------------------|-------------------------------------|
|  |  | 23UG-VEC2-CSE410-3P | Ethics in Information<br>Technology |
|--|--|---------------------|-------------------------------------|



## 23UG-PCC-CSE401 -Automata Theory

[Click for Syllabus Structure](#)

**Teaching Scheme**  
**Lectures** : 2 Hrs/Week  
**Credits** : 2

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

| <b>Course Objective :</b> |   |                  |
|---------------------------|---|------------------|
| 1                         | To introduce mathematical foundations of computation, the theory of formal languages and grammars.                      |                  |
| 2                         | To strengthen the students' ability to understand and conduct mathematical proofs for computations                      |                  |
| 3                         | To understand the types of languages and their properties.  |                  |
| 4                         | To analyse and design finite automata, pushdown automata, grammars & Turing machines                                    |                  |
| <b>Course Outcomes :</b>  |   |                  |
| COs                       | At the end of successful completion of the course, the students will be able to   | Bloom's Taxonomy |
| CO1                       | Demonstrate the basic concept of languages and their properties   | Understand       |
| CO2                       | State and demonstrate the properties of Regular Languages, Context free languages and Recursively Enumerable languages. | Understand       |
| CO3                       | Demonstrate and apply the properties of Regular Grammars and Context Free Grammars.                                     | Apply            |
| CO4                       | Differentiate the various types of languages and identify the respective automata.                                      | Apply            |
| CO5                       | Apply various theories to classify the language as appropriate language.  | Apply            |

| <b>Course Description :</b>   |  |   |
|---|--|---|
| The course introduces some fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton, and Turing machine. |  |   |
| <b>Prerequisites :</b>  | 1  | Discrete Mathematical Structure [23-UG-PCC-CSE305]  |
|   | 2  | Mathematics for Computer Science [23-UG-PCC-CSE303] |
| <b>Section – I</b>  |  |   |
| <b>Unit-1</b>   | <b>Regular Languages and Finite Automata</b>   | <b>08 Hours</b>                                     |
|   | Proofs, Recursive Definitions, Regular expressions and regular languages, Finite Automata, unions, intersection & complements of regular languages, Case Study: use of JFlap Tool to design and understand the machine |   |
| <b>Unit-2</b>   | <b>Nondeterminism and Kleene's Theorem</b>   | <b>06 Hours</b>                                     |
|   | Nondeterministic finite automata, NFA with null transition, Kleene's Theorem (Part I & Part II), Minimal Finite Automata   |   |





|                     |  |                 |
|---------------------|--|-----------------|
| <b>Unit-3</b>       | <b>Context free Grammars</b>   | <b>06 Hours</b> |
|                     | Definition, Regular Grammar, Derivation trees and ambiguity, Simplified forms and normal forms   |                 |
| <b>Section – II</b> |  |                 |
| <b>Unit-4</b>       | <b>Parsing and Pushdown Automata</b>   | <b>07 Hours</b> |
|                     | Definition of Pushdown Automata, Deterministic PDA, Equivalence of CFG's & PDA's, Top down parsing, bottom up parsing                    |                 |
| <b>Unit-5</b>       | <b>Context free and non-context free languages</b>   | <b>05 Hours</b> |
|                     | CFL's and non CFL's, Pumping Lemma, intersections and complements of CFLs  |                 |
| <b>Unit-6</b>       | <b>Turing Machines</b>   | <b>08 Hours</b> |
|                     | Definition, TM as language acceptors, combining Turing Machines, Computing partial function with a TM, Multi-tape TMs, and Universal TM. |                 |

### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 2   | --  | --  | --  | --  | 1   | --  | --  | --  | --   | --   | 2    |
| <b>CO2</b> | 2   | --  | --  | 1   | --  | --  | --  | --  | 1   | --   | --   | 2    |
| <b>CO3</b> | 3   | 1   | 1   | 1   | --  | 1   | --  | --  | --  | --   | --   | 1    |
| <b>CO4</b> | 3   | 2   | 2   | 2   | 1   | 1   | --  | --  | --  | --   | 1    | 2    |
| <b>CO5</b> | 3   | 2   | 2   | 2   | --  | 1   | --  | 1   | --  | --   | 1    | 1    |

|  |  |
|--|--|
| <b>References</b>  |  |
| <b>Text Books :</b>  |  |
| 1  | Introduction to Languages & the Theory of Computations” - John C. Martin (Tata MGH)  |
| <b>Reference Books :</b>   |  |
| 1  | Introduction to Automata Theory, Languages and computation - John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman (Pearson Edition)   |
| 2  | Introduction to theory of Computations - Michael Sipser (Thomson Books/Cole)   |
| 3  | Theory of Computation - Vivek Kulkarni   |
| 4  | Theory of Computation A problem Solving Approach - Kavi Mahesh Wiley India   |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1  | NPTEL Theory of Computation -Prof.Raghunath Tewari   IIT Kanpur<br><a href="https://onlinecourses.nptel.ac.in/noc24_cs71">https://onlinecourses.nptel.ac.in/noc24_cs71</a> |



**Teaching Scheme**  
Lectures : 2 Hrs/Week  
Credits : 2

**Evaluation Scheme**  
ISE : 40 Marks  
ESE : 60 Marks

| <b>Course Objective :</b> |   |                  |
|---------------------------|---|------------------|
| 1                         | make students understand basic concepts of operating system   |                  |
| 2                         | understand what a process is and how processes are synchronized and scheduled                               |                  |
| 3                         | understand different approaches to memory management and I/O Management                                     |                  |
| <b>Course Outcomes :</b>  |   |                  |
| COs                       | At the end of successful completion of the course, the students will be able to                             | Bloom's Taxonomy |
| CO1                       | Learn basic concepts of Operating Systems its types & services.   | Remember         |
| CO2                       | Describe various features of process and operation management   | Understand       |
| CO3                       | Present process synchronization and critical section problem with its solutions                             | Understand       |
| CO4                       | Illustrate the working of different scheduling schemes and basics of deadlock with their possible solutions | Apply            |
| CO5                       | Understand various memory management strategies like paging, swapping, and virtual memory management        | Understand       |

| <b>Course Description :</b>  |   |   |
|--|---|---|
| This course is introduced at second year level to get the students familiar with the basic concepts of computer operating systems. |   |   |
| <b>Prerequisites :</b>   | 1   | Digital Systems & Microprocessors [23UG-PCC-CSE302] |
| <b>Section – I</b>   |   |   |
| <b>Unit-1</b>  | <b>Introduction, Overview and Structure of Operating Systems</b>  | <b>08 Hours</b>                                     |
|  | Overview of Operating Systems, operations of an operating system, OS interaction with computers and user programs, Classes of an OS: Batch Processing, Multiprogramming, Time sharing system, Real-time OS, Distributed OS ,Operating System with Monolithic Structures ,Kernel based OS, Micro-kernel bases OS |   |
| <b>Unit-2</b>  | <b>Process Management</b>   | <b>06 Hours</b>                                     |
|  | Process and Program, Implementing Process: Process state and state transition, Process context and process control block, Context save, scheduling and dispatching, event handling, sharing, communication and synchronization, Introduction to threads   |   |
| <b>Unit-3</b>  | <b>Process Synchronization</b>  | <b>07 Hours</b>                                     |
|  | What is process Synchronization, Race Condition, The Critical section problem, synchronization approaches: looping Vs blocking, H/W support for process synchronization, Classic process synchronization problems:  |   |



|                     |   |                 |
|---------------------|---|-----------------|
|                     | Producer-consumer , Readers and writers, dining Philosophers, Semaphore   |                 |
| <b>Section – II</b> |   |                 |
| <b>Unit-4</b>       | <b>Scheduling</b>   | <b>05 Hours</b> |
|                     | Terminologies and concepts, Non- Pre-emptive scheduling: FCFS, SRN, HRN Pre-emptive scheduling: Round Robin, LCM, STG, Scheduling in practice: Long, medium and short term scheduler                                      |                 |
| <b>Unit-5</b>       | <b>Deadlock</b>   | <b>06 Hours</b> |
|                     | What is deadlock, Deadlock in resource allocation, handling deadlocks, Deadlock detection and resolution, Deadlock prevention, Deadlock avoidance   |                 |
| <b>Unit-6</b>       | <b>Memory Management</b>  | <b>06 Hours</b> |
|                     | Memory allocation to a process: Stack and Heap, Memory allocation Model Heap Management: Reuse of memory, Contiguous memory, Non-Contiguous memory Paging, Segmentation. Virtual Memory Basics, Page replacement Policies |                 |

### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 1   | -   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO2</b> | 1   | -   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO3</b> | 1   | -   | 2   | 3   | -   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO4</b> | 1   | 2   | 1   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| <b>CO5</b> | 1   | 1   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |

| <b>References</b>  |  |
|--|--|
| <b>Text Books :</b>  |  |
| 1  | Operating Systems- A Concept-Based Approach Dhananjay M. Dhamdhare (MGH International) 3 <sup>rd</sup> Edition 2006  |
| <b>Reference Books :</b>   |  |
| 1  | Operating Systems –Concepts and Design, Milan Milenkovic TATA-McGraw Hill, 9 <sup>th</sup> Edition   |
| 2  | Operating Systems: Internals and Design Principles William Stallings AT&T Bell Labs, 8th Edition   |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1  | NOC:Operating System Fundamentals   IIT Kharagpur Prof. Santanu Chattopadhyay<br><a href="https://nptel.ac.in/courses/106105214">https://nptel.ac.in/courses/106105214</a> |

### 23UG-PCC-CSE403–Computer Networks

Teaching Scheme

Evaluation Scheme

[Click for Syllabus Structure](#)



**Lectures** : 3 Hrs/Week  
**Credits** : 2

**ISE** : 40 Marks  
**ESE** : 60 Marks

| <b>Course Objective :</b> |  |                         |
|---------------------------|--|-------------------------|
| 1                         | To understand network types, topologies, and key devices.                                  |                         |
| 2                         | To learn OSI and TCP/IP models and addressing methods.                                     |                         |
| 3                         | To study framing, error detection/correction, and flow control.                            |                         |
| 4                         | To comprehend IP addressing, packet formats, and routing.                                  |                         |
| 5                         | To explore TCP/UDP services and key application protocols like DHCP, DNS,& HTTP            |                         |
| <b>Course Outcomes :</b>  |  |                         |
| <b>COs</b>                | <b>At the end of the successful completion of the course, the students will be able to</b> | <b>Bloom's Taxonomy</b> |
| CO1                       | Recognize different network types, topologies, and devices.                                | Remember                |
| CO2                       | Describe the OSI and TCP/IP models and addressing schemes.                                 | Understand              |
| CO3                       | Implement framing, error detection/correction, and flow control methods.                   | Apply                   |
| CO4                       | Utilize IP addressing, packet formatting, and routing techniques                           | Analyze                 |
| CO5                       | Discuss protocols like DHCP, DNS, FTP, HTTP, and email.                                    | Understand              |

| <b>Course Description :</b>  |   |   |                 |
|--|---|---|-----------------|
| This course is designed to learn, understand and explore the basics of data communication, network structures, protocols, and layer functionalities. |   |   |                 |
| <b>Prerequisites :</b>   | 1   | Digital Systems and Microprocessors [23UG-PCC-CSE302] |                 |
|  | 2   | Computer Programming in C [23FY111]                   |                 |
| <b>Section – I</b>   |   |   |                 |
| <b>Unit-1</b>  | <b>Data Communication and Networking Overview</b>   |   | <b>03 Hours</b> |
|  | Communication model, Data Communication and Networking-Types of Network and Topology, Network Devices:-Hub, Switch, Bridge, Router, Repeater, Modem, NIC etc.   |   |                 |
| <b>Unit-2</b>  | <b>Protocol Architecture Model</b>  |   | <b>05 Hours</b> |
|  | Protocol Layers, Hierarchy, Layered Architecture, Overview of OSI Model, Overview of TCP/IP Model, Comparison between OSI and TCP/IP Protocol suite, Addressing:- Unicast, Multicast and Broadcast  |   |                 |
| <b>Unit-3</b>  | <b>Data Link Layer &amp; Medium Access Control Sub-layer</b>  |   | <b>09 Hours</b> |
|  | Design issues for Data Link Layer, Framing Methods: - Bit, Byte and Character Stuffing, Error Detection Methods: - CRC and Checksum. Error Correction Method:-Hamming Code, Flow Control Noisy and Noiseless Protocols:-Stop and Wait, Sliding Window, Go Back N, Selective Repeat Channel allocation problem, Multiple Access Protocols: CSMA/CD,CSMA/CA |   |                 |
| <b>Section – II</b>  |   |   |                 |



|               |  |                 |
|---------------|--|-----------------|
| <b>Unit-4</b> | <b>Network Layer</b>   | <b>08 Hours</b> |
|               | Network layer services, Addressing:- Classful Addressing/ Classless Addressing, IP packet format, Routing Algorithms:- Properties of routing, Optimality principle, Shortest path routing, Distance Vector routing, Link state routing, Flooding, ICMP |                 |
| <b>Unit-5</b> | <b>Transport Layer</b>   | <b>08 Hours</b> |
|               | Transport layer Services, functions, Process to Process Communication, Addressing-Port numbers, UDP- datagram, services & Applications, TCP – services, Segments and connection, congestion control & Prevention policies                              |                 |
| <b>Unit-6</b> | <b>Introduction to Transport Layer</b>   | <b>07 Hours</b> |
|               | DHCP, DNS, FTP, WWW, HTTP, Email architecture and protocols  |                 |

### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 3   | --  | --  | --  | 1   | 1   | --  | 1   | 1   | 2    | --   | 1    |
| <b>CO2</b> | 3   | --  | --  | 1   | 1   | 2   | --  | --  | --  | 2    | --   | 1    |
| <b>CO3</b> | 3   | 3   | 1   | 2   | 1   | --  | --  | --  | --  | 2    | --   | 1    |
| <b>CO4</b> | 3   | 2   | 2   | 2   | 2   | 1   | 1   | --  | 1   | 2    | --   | 1    |
| <b>CO5</b> | 3   | 1   | --  | 1   | 2   | 2   | 1   | 1   | --  | 2    | 2    | 2    |

| <b>References</b>  |  |
|--|--|
| <b>Text Books :</b>  |  |
| 1  | Data Communications and Networking Behrouz A.Forouzan McGraw Hill 5th Edition 2013   |
| 2  | Computer Networks Andrew S.Tanenbaum, Prentice Hall India, 5th Edition 2011  |
| 3  | TCP/IP Protocol Suite-Behrouz A. Forouzan, McGraw Hill 4th Edition- 2010   |
| <b>Reference Books :</b>   |  |
| 1  | Data & computer communications-William Stallings,Pearson Education India,8th Ed 2009   |
| 2  | Data Communication and Computer Networks-Ajit Pal, Prentice Hall India Learning 1st Ed 2013  |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1  | Computer Networks and Internet Protocols   Prof. SoumyaKanti Ghosh,   IIT Kharagpur<br><a href="https://onlinecourses.nptel.ac.in/noc22_cs19/preview">https://onlinecourses.nptel.ac.in/noc22_cs19/preview</a> |
| 2  | Demystifying Networking By Prof. Sridhar Iyer, Prof. Ashutosh Raina   IIT Bombay<br><a href="https://onlinecourses.nptel.ac.in/noc24_cs69/preview">https://onlinecourses.nptel.ac.in/noc24_cs69/preview</a>    |

## 23UG-PCC-CSE404-Computer Organization and Microcontroller

[Click for Syllabus Structure](#)

**Teaching Scheme**  
Lectures : 3 Hrs/Week

**Evaluation Scheme**  
ISE : 40 Marks



Credits : 2

ESE : 60 Marks

| <b>Course Objective :</b> |   |                         |
|---------------------------|---|-------------------------|
| 1                         | To understand the basic structure and Generations of computer systems.                              |                         |
| 2                         | To explain memory organization and different computer arithmetic algorithms for various operations. |                         |
| 3                         | To understand the fundamental concepts of Embedded system.  |                         |
| 4                         | To know about the various instruction set of ARM Embedded System.                                   |                         |
| <b>Course Outcomes :</b>  |   |                         |
| <b>COs</b>                | <b>At the end of successful completion of the course, the students will be able to</b>              | <b>Bloom's Taxonomy</b> |
| CO1                       | Recognize the basic structure of Computer and standard I/O interfaces.                              | Remember                |
| CO2                       | Explain the basic Concepts of Memory Organization and Processing Unit.                              | Understand              |
| CO3                       | Perform the arithmetic operations using various algorithms.   | Apply                   |
| CO4                       | Describe the fundamental features and applications of embedded system.                              | Understand              |
| CO5                       | Discuss the key concepts of ARM Embedded System and Instruction Set                                 | Understand              |

| <b>Course Description :</b>  |  |   |
|--|--|---|
| This course introduces the principles of computer organization and the basic ARM embedded system concepts. |  |   |
| <b>Prerequisites :</b>   | <b>1</b>   | Digital System and Microprocessor [24UG-PCC-CSE302] |
| <b>Section – I</b>   |  |   |
| <b>Unit-1</b>  | <b>Basic Structure of Computer and I/O Organization</b>  | <b>6 Hours</b>                                      |
|  | Computer Types, Basic Operational Concepts, Performance, Historical Perspectives, Accessing I/O Devices, Interrupts, Direct Memory Access, Buses, Standard I/O Interfaces  |   |
| <b>Unit-2</b>  | <b>Memory Systems and Basic Processing Unit</b>  | <b>6 Hours</b>                                      |
|  | Basic Concepts, Semiconductor RAM Memories: Internal organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Cache Memories: Introduction, Mapping Functions, Replacement Algorithms, Performance Consideration: Hit Rate and Miss Penalty.<br>Basic Processing Unit: Some Fundamental Concepts, Execution of Complete Instructions. |   |
| <b>Unit-3</b>  | <b>Computer Arithmetic</b>   | <b>7 Hours</b>                                      |
|  | Design of Fast Adders, Signed Operand Multiplication, Integer Division, Floating Point Numbers and Operations: IEEE 754 Standard for Floating Point Numbers.   |   |
| <b>Section – II</b>  |  |   |
| <b>Unit-4</b>  | <b>Introduction to Embedded System and Typical Embedded System</b>   | <b>6 Hours</b>                                      |
|  | Introduction to Embedded System: Embedded Vs General Computing   |   |

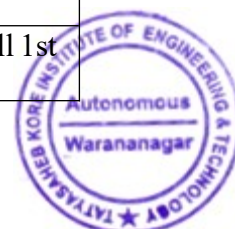


|               |   |                |
|---------------|---|----------------|
|               | System, History of Embedded systems, Classification of Embedded systems, Major applications areas of embedded systems.<br>The Typical Embedded System: Elements of Embedded System, Core of Embedded System, Memory, Sensor and Actuators, External Communication Interface   |                |
| <b>Unit-5</b> | <b>ARM Embedded System and Processing Fundamental</b>   | <b>7 Hours</b> |
|               | Arm Embedded System: The RISC Design Philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. Arm Processing Fundamentals: Registers, Current Program Status Register, Pipeline, Exception, Core Extensions   |                |
| <b>Unit-6</b> | <b>ARM Instruction Set and Assembly Code</b>  | <b>7 Hours</b> |
|               | Introduction to The Arm Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants. Writing and Optimizing Arm Assembly Code: Writing Assembly Code, Profiling and Cycle Counting, Instruction Scheduling, Register Allocation, Conditional Execution, Looping Constructs, Bit Manipulation |                |

### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 2   | --  | --  | 1   | --  | 1   | 1   | 1   | --  | 1    | 1    | 2    |
| <b>CO2</b> | 1   | --  | --  | 2   | 2   | 1   | 1   | --  | --  | --   | --   | 2    |
| <b>CO3</b> | 1   | 2   | 2   | 2   | 2   | 1   | --  | --  | --  | --   | --   | 1    |
| <b>CO4</b> | 1   | --  | --  | 1   | 2   | 2   | 1   | 1   | --  | --   | --   | 2    |
| <b>CO5</b> | 1   | 1   | 1   | 1   | 2   | 1   | 1   | --  | --  | --   | --   | 2    |

| <b>References</b>        |  |
|--------------------------|--|
| <b>Text Books :</b>      |  |
| 1                        | Computer Organization Carl Hamacher, Zvonko Vranesic and Safwat Zaky Tata McGraw Hill-5 <sup>th</sup> Edition 1988 |
| 2                        | ARM System Developer's Guide, Andrew Sloss, Morgan Kaufmann 2 <sup>nd</sup> Edition 2004                           |
| 3                        | Introduction to Embedded Systems, Shibu K. V Tata McGraw Hill 2 <sup>nd</sup> Edition 2020                         |
| <b>Reference Books :</b> |  |
| 1                        | Computer Architecture and Organization, William Stallings, Tata McGraw Hill 10 <sup>th</sup> 2016                  |
| 2                        | Computer Systems Organization & Architecture, John D. Carpinelli Pearson Education 1 <sup>st</sup> 2002            |
| 3                        | Microcontroller (ARM) and Embedded System, Raghunandan G. H. Cengage Learning 1 <sup>st</sup> Edition 2020         |
| 4                        | Embedded Systems: Architecture, Programming and Design Raj Kamal, Tata McGraw Hill 1 <sup>st</sup> 2012            |



|  |  |
|--|--|
| 5  | ARM System on-chip Architecture Steve Furber Pearson Education 2nd 2012  |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1  | NPTEL Course on Computer organization and Architecture   Prof. Indranil Sengupta, Prof. Kamalika Datta   IIT Kharagpur   <a href="https://onlinecourses.nptel.ac.in/noc22_cs88/preview">https://onlinecourses.nptel.ac.in/noc22_cs88/preview</a> |
| 2  | NPTEL Course on Microprocessors And Microcontrollers By Prof. Santanu Chattopadhyay   IIT Kharagpur   <a href="https://onlinecourses.nptel.ac.in/noc20_ee42/preview">https://onlinecourses.nptel.ac.in/noc20_ee42/preview</a>                    |

|   |  |
|---|--|
| <b>Virtual Lab</b> (Operational Timestamp: Saturday,09-July-2024 on 3:45PM) |  |
| 1   | Computer Organization and Architecture Lab   <a href="https://coa-iitkgp.vlabs.ac.in/">https://coa-iitkgp.vlabs.ac.in/</a> |
| 2   | Computer Organization   <a href="https://cse11-iiith.vlabs.ac.in/">https://cse11-iiith.vlabs.ac.in/</a>                    |





## 23UG-MDM2-CSE405– Data Analytics with R/Python

[Click for Syllabus Structure](#)

**Teaching Scheme**  
**Lectures** : 2 Hrs/Week  
**Credits** : 2

**Evaluation Scheme**  
**ISA(TW)** : 50 Marks

| <b>Course Objective :</b> |   |                         |
|---------------------------|---|-------------------------|
| 1                         | Provide students with a solid foundation in Python programming, including built-in data structures, functions, and file handling.   |                         |
| 2                         | Develop students' skills in using NumPy for array manipulations, vectorized computations, and performing linear algebra tasks.  |                         |
| 3                         | Train students to utilize Pandas for constructing data structures, computing descriptive statistics, and handling various data formats including text, binary, and web APIs           |                         |
| 4                         | Equip students with techniques for handling missing data, transforming data, and performing complex data manipulations such as merging, reshaping, and pivoting.                      |                         |
| 5                         | Enable students to create insightful visualizations using Matplotlib, Pandas, and Seaborn, and perform advanced data aggregation, grouping, and time series analysis.                 |                         |
| <b>Course Outcomes :</b>  |   |                         |
| <b>COs</b>                | <b>At the end of successful completion of the course, the students will be able to</b>  | <b>Bloom's Taxonomy</b> |
| CO1                       | Effectively utilize Python's built-in data structures, functions, and file handling capabilities for various programming tasks.   | Apply                   |
| CO2                       | Demonstrate proficiency in creating and manipulating NumPy arrays, performing vectorized computations, and solving linear algebra problems.   | Apply                   |
| CO3                       | Capable of constructing Pandas data structures, computing descriptive statistics, reading/writing data in different formats, and interacting with web APIs and databases.             | Analyse                 |
| CO4                       | Adeptly handle missing data, transform and manipulate datasets, combine and merge data, and reshape/pivot data for analysis.  | Evaluate                |
| CO5                       | Create clear and informative visualizations using Matplotlib, Pandas, and Seaborn, and perform advanced grouping, aggregation, and time series analysis to derive insights from data. | Create                  |

| <b>Course Description :</b>   |          |  |
|---|----------|--|
| <p>The course introduces data analytics using Python, covering Python basics, data structures, and file handling. Students will learn to use NumPy for numerical computations and Pandas for data manipulation. The course includes advanced data cleaning, transformation, and visualization techniques using Matplotlib, Pandas, and Seaborn, along with time series analysis. By the end, students will be equipped to analyze and visualize data effectively.</p> |          |  |
| <b>Prerequisites :</b>  | <b>1</b> | Mathematics for Computer Science [23UG-PCC-CSE303] |
|   | <b>2</b> | Data Structure [23UG-PCC-CSE301]                   |



| Section – I  |   |             |
|--------------|---|-------------|
| Unit-1       | <b>Built in Data Structures, Functions and Files in Python</b>  | 05<br>Hours |
|              | Python Basics, Data Structures and Sequences Functions, Files and Operating Systems.  |             |
| Unit-2       | <b>NumPy Basics: Arrays and Vectorized Computation.</b>   | 06<br>Hours |
|              | The NumPy and array, Universal Functions ,Array Programs ,Linear Algebra  |             |
| Unit-3       | <b>Pandas and Data Loading</b>  | 04<br>Hours |
|              | Introductions to Pandas Data structures ,Computing Descriptive Statistics , Reading and Writing Data in Text & Files , Binary Data Formats ,Interacting with web APIs and Databases |             |
| Section – II |   |             |
| Unit-4       | <b>Data Cleaning and Data Wrangling</b>   | 05<br>Hours |
|              | Handling Missing Data, Data Transformation, String Manipulation Indexing Combining and Merging Datasets, Reshaping and Pivoting.  |             |
| Unit-5       | <b>Plotting, Visualization, Data Aggregation and Group Operation</b>  | 04<br>Hours |
|              | Working with Matplotlib, Ploting with Pandas & Seaborn, Group By Mechanics , Data Aggression, Split-Apply & Combine   |             |
| Unit-6       | <b>Time Series and Advanced Pandas</b>  | 06<br>Hours |
|              | Time series Basics, Date Ranges, Frequencies Categorical Data, Advanced group By Use Method, Chaining.  |             |

### Mapping of POs & COs:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | --  | 2   | 2   | --  | --  | --  | --  | --   | --   | --   |
| CO2 | 3   | 3   | --  | --  | 1   | --  | --  | --  | --  | --   | --   | --   |
| CO3 | 3   | 2   | --  | --  | 2   | --  | --  | --  | --  | --   | --   | --   |
| CO4 | 3   | --  | --  | --  | 3   | --  | --  | --  | --  | --   | --   | --   |
| CO5 | 2   | --  | --  | --  | 3   | --  | --  | --  | 2   | --   | --   | --   |

| References   |   |
|--|---|
| <b>Text Books :</b>  |   |
| 1  | Python For Data Analytics -Wes McKinney O'REILLY,2nd-2017   |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |   |
| 1  | NPTEL Course on Data Analytics with Python  Prof. A Ramesh   IIT Roorkee<br><a href="https://onlinecourses.nptel.ac.in/noc21_cs45">https://onlinecourses.nptel.ac.in/noc21_cs45</a> |



## 23UG-OE1-CSE406-1-Internet of Things

[Click for Syllabus Structure](#)

**Teaching Scheme**  
**Lectures** : 3 Hrs/Week  
**Credits** : 3

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

| <b>Course Objective :</b> |   |                  |
|---------------------------|---|------------------|
| 1                         | To understanding of core IoT concepts and frameworks.   |                  |
| 2                         | To Provide knowledge on IoT mechanisms, including traffic characteristics, scalability, and security. |                  |
| 3                         | Understanding of RFID technology and its components in IoT systems.                                   |                  |
| 4                         | Enable hands-on experience with IoT hardware and software, focusing on Raspberry Pi.                  |                  |
| 5                         | To apply IoT technologies in real-world scenarios like smart cities and home automation.              |                  |
| <b>Course Outcomes :</b>  |   |                  |
| COs                       | At the end of successful completion of the course, the students will be able to                       | Bloom's Taxonomy |
| CO1                       | To discuss IoT Concepts and Frameworks  | Understand       |
| CO2                       | To learn and implement RFID technology in various applications  | Remember         |
| CO3                       | To identify and describe the components of an RFID system   | Understand       |
| CO4                       | To write programs for basic applications  | Understand       |
| CO5                       | To state IoT technologies in various real-world applications  | Remember         |

| <b>Course Description :</b>  |   |   |
|--|---|---|
| This course provides an in-depth introduction to the Internet of Things (IoT), covering fundamental mechanisms, identification technologies, communication protocols, and practical applications, including hands-on experience with Raspberry Pi and various IoT systems. |   |   |
| <b>Prerequisites :</b>   | 1   | Fundamentals of Computer Network and Internet [23UG-PCC-CSE403] |
| <b>Section – I</b>   |   |   |
| <b>Unit-1</b>  | <b>Introduction</b>   | <b>03 Hours</b>   |
|  | IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs   |   |
| <b>Unit-2</b>  | <b>Fundamental of IoT mechanisms</b>  | <b>04 Hours</b>   |
|  | Identification of IoT objects and services, Traffic characteristics, scalability and interoperability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology |   |
| <b>Unit-3</b>  | <b>Radio Frequency Identification Technology</b>  | <b>05 Hours</b>   |
|  | RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes.  |   |
| <b>Section – II</b>  |   |   |



|               |   |                 |
|---------------|---|-----------------|
| <b>Unit-4</b> | <b>IoT systems</b>  | <b>04 Hours</b> |
|               | Hardware and Software: Introduction to Raspberry Pi, Familiar with Raspberry Pi hardware, study of I/O ports, Programming with Raspberry Pi: Study of operating system.                                 |                 |
| <b>Unit-5</b> | <b>Communication Technologies</b>   | <b>05 Hours</b> |
|               | WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, WLAN, Cellular and mobile technologies   |                 |
| <b>Unit-6</b> | <b>IoT Application Examples</b>   | <b>05 Hours</b> |
|               | Smart Metering, advanced metering infrastructure, e-health / Body Area Network, City Automation (Smart City), Automotive Application, Environmental Applications, Home Automation, Control Applications |                 |

### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 3   | 1   | 2   | 1   | 2   | 2   | 1   | 1   | 1   | 1    | 1    | 3    |
| <b>CO2</b> | 3   | 2   | 2   | 3   | 3   | 1   | 1   | 1   | 1   | 1    | 1    | 2    |
| <b>CO3</b> | 3   | 3   | 2   | 2   | 3   | 1   | 1   | 1   | 1   | 1    | 1    | 2    |
| <b>CO4</b> | 3   | 3   | 3   | 3   | 3   | 1   | 1   | 1   | 2   | 2    | 2    | 3    |
| <b>CO5</b> | 3   | 2   | 3   | 3   | 3   | 3   | 3   | 2   | 3   | 3    | 3    | 3    |

| <b>References</b>  |  |
|--|--|
| <b>Text Books :</b>  |  |
| 1  | The Internet of Things-Connecting Objects to the Web, Hakima Chaouchi Wiley Publications 1 <sup>st</sup> Edition 2010                    |
| 2  | Building the Internet of Things, Daniel Minoli, Wiley Publications, 1 <sup>st</sup> Edition-2013   |
| 3  | Introduction to Wireless Telecommunications systems and Networks, Gary J. Mullett, Cengage Learning, India Edition 2006                  |
| <b>Reference Books :</b>   |  |
| 1  | Raspberry Pi for Dummies, Sean McManus, Mike Cook, Wiley (2 March 2023); Wiley India Pvt Ltd   |
| 2  | Architecting the Internet of Things-Bernd Scholz, Reiter Springer 1st edition 2011   |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1  | <a href="https://onlinecourses.nptel.ac.in/noc22_cs95/preview">https://onlinecourses.nptel.ac.in/noc22_cs95/preview</a> [IIT Kharagpur]  |
| 2  | <a href="https://onlinecourses.nptel.ac.in/noc22_cs96/preview">https://onlinecourses.nptel.ac.in/noc22_cs96/preview</a> [IIT Kharagpur]  |
| 3  | <a href="https://onlinecourses.swayam2.ac.in/arp20_ap03/preview">https://onlinecourses.swayam2.ac.in/arp20_ap03/preview</a> [IIT Patana] |



## 23UG-VSEC-CSE407P - Python Programming

[Click for Syllabus Structure](#)

|                        |              |
|------------------------|--------------|
| <b>Teaching Scheme</b> |              |
| <b>Lectures</b>        | : 2**        |
| <b>Practical</b>       | : 4 Hrs/Week |
| <b>Credits</b>         | : 2          |

|                          |      |
|--------------------------|------|
| <b>Evaluation Scheme</b> |      |
| <b>ISA(TW)</b>           | : 25 |
| <b>ESE(POE)</b>          | : 50 |

| Course Objective : |  |                  |
|--------------------|--|------------------|
| 1                  | To learn and understand programming paradigm and Python basics   |                  |
| 2                  | To learn and understand python looping, control statements and string manipulations                        |                  |
| 3                  | To acquire Object Oriented Programming skills and concepts of file handling                                |                  |
| Course Outcomes :  |  |                  |
| COs                | At the end of successful completion of the course, the students will be able to                            | Bloom's Taxonomy |
| CO1                | To recall the concepts of Python Programming Language in Problem Solving scenario                          | Remember         |
| CO2                | Utilize of key concepts in the file handling, string handling, exception handling of strings and functions | Apply            |
| CO3                | To illustrate object oriented concepts in various real time problems                                       | Apply            |
| CO4                | To implement file handling and exception handling concepts for a given scenario                            | Apply            |
| CO5                | Plotting the data using appropriate Python visualization libraries/packages                                | Apply            |

| Course Description :  |   |   |                 |
|---|---|---|-----------------|
| This course provides an introduction to Python Programming language. Students are introduced to key programming concepts like data structures, conditionals, loops, variables, and functions. |   |   |                 |
| <b>Prerequisites :</b>  | 1   | Computer Programming in C Lab [23FY111]                   |                 |
|   | 2   | Data Structure [23UG-PCC-CSE301]                          |                 |
|   | 3   | Object Oriented Programming using C++ [23UG-VRC1-CSE3081] |                 |
| Section – I   |   |   |                 |
| <b>Unit-1</b>   | <b>Basics of Python Programming</b>   |   | <b>04 Hours</b> |
|   | Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions Decision Control Systems: Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops. |   |                 |
| <b>Unit-2</b>   | <b>Functions and Modules</b>  |   | <b>04</b>       |



|                     |   |                 |
|---------------------|---|-----------------|
|                     | Definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules. | <b>Hours</b>    |
| <b>Unit-3</b>       | <b>Python Strings &amp; Data Structures</b>   | <b>06 Hours</b> |
|                     | Python Strings: Concatenating, appending & multiplying strings, built in string functions, slicing, comparing strings Data Structures: Sequence, Lists, Tuples, Set, Dictionaries   |                 |
| <b>Section – II</b> |   |                 |
| <b>Unit-4</b>       | <b>Classes and Objects</b>  | <b>03 Hours</b> |
|                     | Creating and Using a Class, Working with Classes and Instances, Inheritance & Polymorphism.   |                 |
| <b>Unit-5</b>       | <b>Exception Handling &amp; File Handling</b>   | <b>05 Hours</b> |
|                     | Exception Handling: Introduction to Errors & Exceptions, handling exceptions, multiple except blocks. File Handling: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files.   |                 |
| <b>Unit-6</b>       | <b>Data Analysis &amp; Visualization</b>  | <b>04 Hours</b> |
|                     | NumPy: Creating Arrays, Array indexing, Array Slicing & Built-in Functions Pandas: Series, Framework, Built-in Functions of pandas Matplotlib: Plotting, marker, labels, grid, scatter, bars, histograms, pie charts  |                 |

| <b>Expt . No.</b> | <b>Experiments</b>  |
|-------------------|---|
| 1                 | [Basic] Handling of different data types and arithmetic operations  |
| 2                 | [Control Flow] Handling various loops, control statements   |
| 3                 | [Control Flow] Performing various operation on String (String Handling)   |
| 4                 | [Data Structure] Handling Python Data Structures  |
| 5                 | [File] Different File Handling Operations   |
| 6                 | [Functions] Concepts of function and its usage  |
| 7                 | [Object Oriented Programming] Concepts of constructor and Inheritance in Python   |
| 8                 | (a) To demonstrate working of classes and objects (b) To demonstrate constructors (c) To demonstrate class method and static method |
| 9                 | Concept of polymorphism in python (method overloading and overriding)   |
| 10                | Concepts of Data Analysis and Visualization   |



### Mapping of POs & COs:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | -   | 1   | -   | -   | -   | -   | -   | -   | -    | -    | 2    |
| CO2 | 3   | 3   | 1   | 2   | 2   | -   | -   | -   | -   | -    | 1    | 2    |
| CO3 | 3   | 2   | 2   | 3   | 3   | 1   | -   | -   | 1   | -    | 1    | 2    |
| CO4 | 3   | 2   | 3   | 1   | 1   | 2   | 1   | -   | 2   | 1    | 2    | 2    |
| CO5 | 3   | 2   | 2   | 1   | -   | -   | 1   | 1   | -   | 1    | -    | 1    |

| References   |   |
|--|---|
| <b>Text Books :</b>  |   |
| 1  | Python Programming Using Problem Solving Approach (for Unit 1,2,3,4),Reema Thareja Oxford University Press.-2017  |
| 2  | Python Crash Course: A Hands-On Project-Based Introduction to Programming (for Unit 5,6)Eric Matthes No Starch Press-2019   |
| <b>Reference Books :</b>   |   |
| 1  | Core Python Programming-R. Nageswara Rao, Dreamtech Press, 2 <sup>nd</sup> (2017)   |
| 2  | Learning Python, Romano Fabrizio Packt Publishing Limited,2 <sup>nd</sup> Edition (2015)  |
| 3  | Head First Python- A Brain Friendly Guide Paul Barry, SPD O'Reilly (2011)   |
| 4  | Python: The Complete Reference-Martin C. Brown, McGraw Hill Education,1st Edition (2018)  |
| <b>SWAYAM Courses</b> (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |   |
| 1  | NPTEL Course on Programming, Data Structures and Algorithms using Python<br>  Prof. Madhavan Mukund   Chennai Mathematical Institute<br><a href="https://onlinecourses.nptel.ac.in/noc24_cs78/preview">https://onlinecourses.nptel.ac.in/noc24_cs78/preview</a> |
| 2  | NPTEL Course on Programming in Python<br>  Dr.Rizwan Rehman  Dibrugarh University<br><a href="https://onlinecourses.nptel.ac.in/noc24_cs78/preview">https://onlinecourses.nptel.ac.in/noc24_cs78/preview</a>  |
| <b>Virtual Lab</b> (Operational Timestamp: Thu,11-July-2024 on 03:45 PM)   |   |
| 1  | <a href="https://python-iitk.vlabs.ac.in/">https://python-iitk.vlabs.ac.in/</a>   |



आधुनिक भारतीय भाषा

23UG-A-CSE408-1 मराठी भाषेतील विशेष साहित्य कृतींचा अभ्यास

[Click for Syllabus Structure](#)

| अध्यापन योजना |                | मूल्यमापन योजना |             |
|---------------|----------------|-----------------|-------------|
| अधिव्याख्यने  | : २ तास/सप्ताह | सत्रमूल्यांकन   | : २५ गुण    |
| श्रेयांक      | : २            | सत्रांत परीक्षा | : लागू नाही |
| ट्यूटोरियल    | : लागू नाही    |                 |             |

| अभ्यासक्रमाचा उद्देश :   |  |
|--|--|
| १  | विद्यार्थ्यांच्यात मराठी भाषा आणि साहित्याविषयी जिज्ञासा निर्माण करणे. |
| २  | मराठी भाषेतील प्रतिभावंत साहित्यिकांच्या कृतींचा अभ्यास करणे.          |
| ३  | मराठी साहित्याच्या वाचनाची आवड निर्माण करणे                            |
| ४  | मराठी भाषेच्या प्रचार-प्रसारासाठी विविध उपक्रम राबवणे                  |
| ५  | संगणक अभियांत्रिकीतील संकल्पना मराठी भाषेतून विशद करणे                 |
| अभ्यासक्रमाचा विधेय : अभ्यासक्रम यशस्वीरीत्यापूर्ण केल्यावर विद्यार्थी खालील विधेये साध्य करेल |  |
| वि.१   | मराठीतील विख्यात साहित्याचा आणि साहित्यिकांचा धांडोळा घेईल.            |
| वि.२   | अभ्यासक्रमाव्यतिरिक्त इतर साहित्यिकांच्या साहित्याचा आस्वाद घेईल.      |
| वि.३   | विद्यार्थ्यांच्यात अवांतर वाचनाची गोडी लागेल.                          |
| वि.४   | सभाधीटपणा, नाट्य, संभाषण, वक्तृत्व विविध कला अवगत होतील.               |
| वि.५   | संगणक अभियांत्रिकीतील संकल्पना मातृभाषेतून अधिक सुस्पष्ट होतील.        |

| विवरण  |   |
|--|---|
| <p>मराठी भाषेतील विशेष साहित्यकृतींचा अभ्यास"या विषयाचा क्षमता वृद्धिंगत अभ्यासक्रमांतर्गत समावेश करणेत आलेला आहे. संगणक अभियांत्रिकीतील संकल्पना मातृभाषेतून स्पष्ट केल्यास, विद्यार्थ्यांना त्या संकल्पना प्रभावीरीत्या समजण्यास मदत होते. संगणक अभियांत्रिकीच्या इंग्रजीतील शिक्षणामुळे विद्यार्थी आपल्या मातृभाषेपासून आणि पर्यायाने त्यातील साहित्या पासून दूर जाऊ शकतो. हा दुरावा कमी करणे, हा या विषयाचा मूळ उद्देश आहे. या विषयांतर्गत, मराठी भाषा :उत्पत्ती आणि विकास, विशेष साहित्यकृतींचा अभ्यास-गद्य, विशेष साहित्यकृतींचा अभ्यास-पद्य, मराठी रंगभूमी - एक सांस्कृतिक वारसा आणि उपक्रम असे एकूण पाच घटक समाविष्ट करण्यात आलेले आहेत.</p> |   |
| विषय घटक   |   |
| घटक १  | <p><b>मराठी भाषा :उत्पत्ती आणि विकास</b></p> <p>प्राचीनकाल, मध्ययुग, मध्ययुगीनकाल, साहित्य आणि सांस्कृतिक विकास, मराठा साम्राज्यातील मराठी साहित्य, २०व्या शतकातील मराठी भाषेची उत्क्रान्ती, मराठी भाषेची सद्यस्थिती</p>    |
| घटक २  | <p><b>विशेष साहित्यकृतींचा अभ्यास - गद्य</b></p> <p>मराठी साहित्यातील ख्यातनाम साहित्यिकांची ओळख आणि त्यांच्या साहित्यकृती - आचार्य प्र. के. अत्रे, पु. ल. देशपांडे, रणजीत देसाई, विश्वास पाटील, अण्णा भाऊ साठे इत्यादी</p> |
| घटक ३  | <p><b>विशेष साहित्य कृतींचा अभ्यास - पद्य</b></p> <p>मराठी साहित्यातील ख्यातनाम कवी आणि कवयित्रींची ओळख व त्यांच्या पद्यकृती - बहिणाबाई चौधरी, मंगेश पाडगावकर, इंदिरा संत, बा. भ. बोरकर, सुरेश भट इत्यादी</p>               |





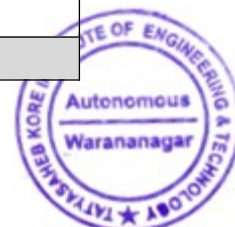
|                         |   |           |
|-------------------------|---|-----------|
| घटक ४                   | मराठी रंगभूमी – एक सांस्कृतिक वारसा   | ०४<br>तास |
|                         | मराठी रंगभूमीची ओळख, मराठी नाट्यप्रकार, विख्यात मराठी नाटककार – गोविंद बल्लाळ देव, आचार्य प्र. के. अत्रे, पु. ल. देशपांडे, शंकरराव किलोस्कर, राम गणेश गडकरी इत्यादी |           |
| घटक ५                   | उपक्रम  | ०८<br>तास |
|                         | वरील साहित्य कृतींचे सादरीकरण, हिप-हॉपशो, नाटिका, काव्यवाचन, कवितेचे रसग्रहण, अभिवाचन, संगणक अभियांत्रिकीतील एखाद्या संकल्पनेचे मराठी भाषेत अधिव्याख्यान, इत्यादी   |           |
| <b>संदर्भग्रंथ सूची</b> |   |           |
| १                       | अमृतसिद्धी: १ व २, मंगला गोडबोले व स.ह.देशपांडे,मौज प्रकाशनगृह  |           |
| २                       | व्यक्ती आणि वल्ली, पु.ल.देशपांडे मौज प्रकाशनगृह   |           |
| ३                       | मी कसा झालो? प्र.के.अत्रे, परचुरे प्रकाशन   |           |
| ४                       | स्वामी, रणजीत देसाई, मेहता पब्लिशिंग हाउस   |           |
| ५                       | झाडाझडती, विश्वास पाटील, राजहंस प्रकाशन   |           |
| ६                       | बहिणाबाईची गाणी, बहिणाबाई चौधरी, सुचित्रा प्रकाशन   |           |
| ७                       | बोलगाणी, मंगेश पाडगांवकर, मौज प्रकाशनगृह  |           |
| ८                       | बोरकरांची समग्रकविता, खंड १ व २, बा. भ. बोरकर, देशमुख आणि कंपनी   |           |
| ९                       | मृदूंध, इंदिरा संत, मेहता पब्लिशिंगहाउस   |           |
| १०                      | रंग माझा वेगळा, सुरेश भट, मौज प्रकाशन गृह   |           |



**23UG-EEC2-CSE409-1P– Soft Skills**[Click for Syllabus Structure](#)**Teaching Scheme****Practical** : 2 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

| <b>Course Objective :</b> |   |                         |
|---------------------------|---|-------------------------|
| 1                         | To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.       |                         |
| 2                         | To develop and nurture the soft skills of the students through individual and group activities.   |                         |
| 3                         | To expose students to right attitudinal and behavioural aspects and to build the same through activities.   |                         |
| <b>Course Outcomes :</b>  |   |                         |
| <b>COs</b>                | <b>At the end of successful completion of the course, the students will be able to</b>  | <b>Bloom's Taxonomy</b> |
| CO1                       | Effectively communicate through verbal/oral communication and improve the listening skills  | Understanding           |
| CO2                       | Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.   | Understand              |
| CO3                       | Prepare precise briefs or reports and technical documents   | Apply                   |
| CO4                       | Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality. | Understand              |
| CO5                       | Present themselves with corporate readiness   | Apply                   |

| <b>Course Description :</b>  |  |                            |
|--|--|----------------------------|
| This course focuses on to develop the wide varieties of soft skills like communication, behaviour , team building, leadership and other professional skills etc. |  |                            |
| <b>Prerequisites :</b>   | <b>1</b>   | Basics of English language |
| <b>Section – I</b>   |  |                            |
| <b>Unit-1</b>  | <b>Understanding Communication Skills:</b>   | <b>04 Hours</b>            |
|  | Understanding Communication Skills: Verbal Communication - Effective Communication - Active listening – Articulation Paraphrasing – Feedback Non- Verbal Communication- Body Language of self and others         |                            |
| <b>Unit-2</b>  | <b>Behavioural Skills /Self Development:</b>   | <b>04 Hours</b>            |
|  | SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self-esteem.   |                            |
| <b>Unit-3</b>  | <b>Leadership and Team Building</b>  | <b>04 Hours</b>            |
|  | Culture and Leadership- Salient Features of Corporate Culture, Leadership Styles, Leadership Trends, Team Building- Team Development Stages, Types of Teams, Attributes of a successful team – Barriers involved |                            |
| <b>Section – II</b>  |  |                            |



|               |   |                 |
|---------------|---|-----------------|
| <b>Unit-4</b> | <b>Developing Writing skills</b>  | <b>04 Hours</b> |
|               | E-mail writing, report writing, resumes writing, practice.  |                 |
| <b>Unit-5</b> | <b>Stress and Time Management</b>   | <b>04 Hours</b> |
|               | Stress in Today's Time- Identify the Stress Source, Signs of Stress, Ways to Cope with Stress. Healthier Ways to Combat Stress, Steps to be taken in the Organizations: Open communication, Time Management, Working towards Your Goals, Smart Work, Prioritize your Tasks.   |                 |
| <b>Unit-6</b> | <b>Professional Skill</b>   | <b>04 Hours</b> |
|               | Ethics, Etiquette and Mannerism-All types of Etiquette (at Meetings, Etiquette at Dining. Involuntary Awkward Actions, Public Relations Office (PRO)' s Etiquettes) Technology Etiquette: Phone Etiquette, Email Etiquette, Social Media Etiquette, Video Conferencing Etiquette, Interview Etiquette. Dressing Etiquettes: for Interview, offices and social functions. Ethical Values: Importance of Work Ethics, Problems in the Absence of Work Ethics. |                 |

| <b>Expt . No.</b> | <b>Experiments</b>   |
|-------------------|--|
| 1                 | <b>Getting acquainted with Behavioral Skills &amp; Self Analysis</b>   |
|                   | <ul style="list-style-type: none"> <li>▪ Personality Types - Extraversion, Introversion, Intuition, Thinking, Perceiving</li> <li>▪ Meaning and Importance of <b>SWOC analysis</b></li> <li>▪ Johari window model - Building Self-Awareness and Trust</li> <li>▪ How to improve self confidence</li> </ul> |
| 2                 | <b>Developing Leadership and Team building Qualities</b>   |
|                   | <ul style="list-style-type: none"> <li>▪ What are Leadership qualities and Why are they important?</li> <li>▪ Corporate Leadership Types and Style</li> <li>▪ What is a Team and Team Development Stages?</li> <li>▪ Types and Attributes of Successful Team</li> </ul>                                    |
| 3                 | <b>Formal Writing Skills</b>   |
|                   | <ul style="list-style-type: none"> <li>▪ Write Business Letters and Email</li> <li>▪ Report Writing</li> <li>▪ Job application and Resume Writing</li> </ul>   |
| 4                 | <b>Effective Stress Management and Time Management</b>   |
|                   | <ul style="list-style-type: none"> <li>▪ What is Stress? Sources and types of stress</li> <li>▪ Stress Management Techniques</li> <li>▪ Time Management Techniques</li> <li>▪ Strategies for effective time management</li> </ul>  |
| 5                 | <b>Set of activity</b>   |
|                   | <ul style="list-style-type: none"> <li>▪ Group task encouraging discussions</li> <li>▪ Team building, value sharing</li> <li>▪ Leadership and role play all at the same time</li> </ul>  |



### Mapping of POs & COs:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | -   | -   | -   | -   | -   | -   | -   | 3   | 3    | -    | -    |
| CO2 | -   | -   | -   | -   | -   | -   | -   | -   | 3   | 3    | -    | 2    |
| CO3 | -   | -   | -   | -   | -   | -   | -   | -   | 3   | 2    | -    | 2    |
| CO4 | -   | -   | -   | -   | -   | -   | -   | 2   | 1   | 2    | -    | 1    |
| CO5 | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3    | -    | -    |

| References   |  |
|--|--|
| <b>Text Books :</b>  |  |
| 1  | Developing Communication Skills-Krishna Mohan and Meera Banerji, MacMillan India Ltd., Delhi 2nd Edition 2009                          |
| 2  | Soft Skills – An Integrated Approach to Maximize Personality-Gajendra Singh Chauhan, Sangeeta Sharma-WILEY INDIA, 1st Edition 2015     |
| 3  | Essentials of Effective communication-Ludlow and Pantheon Prentice Hall of India. 1st Edition 1992                                     |
| <b>Reference Books :</b>   |  |
| 1  | An Approach to Communication Skills-Indrajit Bhattacharya, New Delhi DhanpatRai,2nd Edition 2011                                       |
| <b>Virtual Lab</b> (Operational Timestamp: Thu,11-July-2024 on 03:45 PM) |  |
| 1  | Virtual Lab IIT Guwahati-Virtual English and Communication Lab <a href="https://ve-iitg.vlabs.ac.in/">https://ve-iitg.vlabs.ac.in/</a> |



**23UG-VEC2-CSE410-1P - Designing Digital Solutions for Society Problems  
(Mini Project-I)**

[Click for Syllabus Structure](#)

**Teaching Scheme**

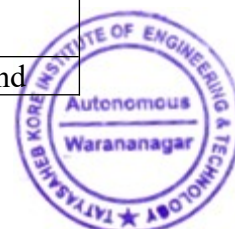
**Lecture** : 1 Hr/Week  
**Practical** : 2 Hrs/Week  
**Credits** : 1

**Evaluation Scheme**

**ISA(TW)** : 25 Marks  
**ESE(POE)** : 25 Marks

| <b>Course Objective:</b> |  |                         |
|--------------------------|--|-------------------------|
| <b>1</b>                 | To form teams and share responsibilities according to individual skill strengths.                      |                         |
| <b>2</b>                 | To reveal the students to design and solve digital solutions for society problems.                     |                         |
| <b>3</b>                 | To utilize the techniques, skills and modern Engineering tools for building the mini project.          |                         |
| <b>4</b>                 | To follow the methods and tasks as per SDLC Approach   |                         |
| <b>5</b>                 | To effectively demonstrate and present the ideas, methodology and technology used for the mini project |                         |
| <b>Course Outcomes:</b>  |  |                         |
| <b>CO's</b>              | <b>At the end of successful completion of the course, the students will be able to</b>                 | <b>Bloom's Taxonomy</b> |
| <b>CO1</b>               | Articulate a specific problemstatement for the societal need point of view.                            | Understand              |
| <b>CO2</b>               | Develop the mini project requirement and specification.  | Understand              |
| <b>CO3</b>               | Design the various modules.  | Understand              |
| <b>CO4</b>               | Implement the mini project using appropriate programming language.                                     | Apply                   |
| <b>CO5</b>               | Prepare the report and present the mini project.   | Apply                   |

| <b>Course Description :</b>  |   |   |
|--|---|---|
| The Mini Project is designed to make the students to apply their practical knowledge with relevant tools and techniques to solve the society problems. |   |   |
| <b>Prerequisites :</b>   | <b>1</b>  | Data Structures [23UG-PCC-CSE301]                         |
|  | <b>2</b>  | Software Engineering [23UG-PCC-CSE304]                    |
|  | <b>3</b>  | Object Oriented Programming using C++ [23UG-VEC1-CSE3081] |
| <b>Sr.No</b>   | <b>Course Content</b>   | <b>Bloom's Taxonomy</b>                                   |
| <b>Activity-1</b>  | <b>Identifying the area of Mini Project for Society Problems</b>      | Understand  |
|  | Students must identify the area to solve different kinds of problems. |   |
| <b>Activity-2</b>  | <b>Problem Identification</b>   | Understand  |



|                    |   |          |
|--------------------|---|----------|
|                    |   |          |
|                    | Students must identify the problem from chosen area.  |          |
| <b>Activity-3</b>  | <b>First Presentation</b>   | Apply    |
|                    | First Presentation on Synopsis  |          |
| <b>Activity-4</b>  | <b>Requirement Elicitation</b>  | Apply    |
|                    | Students must elicit the requirement for identified problem.                                    |          |
| <b>Activity-5</b>  | <b>Requirement Analysis.</b>  | Analysis |
|                    | Students must analyse the requirement for identified problem                                    |          |
| <b>Activity-6</b>  | <b>Preparation of SRS Document.</b>   | Apply    |
|                    | Students must prepare the SRS document.   |          |
| <b>Activity-7</b>  | <b>Second Presentation.</b>   | Apply    |
|                    | Second Presentation on SRS documents  |          |
| <b>Activity-8</b>  | <b>Finalization of modules for Mini Project.</b>  | Apply    |
|                    | Students must finalize the number of modules for mini project.                                  |          |
| <b>Activity-9</b>  | <b>Design the Modules.</b>  | Apply    |
|                    | Students must determine the suitable data structures and algorithms to solve identified problem |          |
| <b>Activity-10</b> | <b>Module Implementation</b>  | Apply    |
|                    | Students must implement different modules.  |          |
| <b>Activity-11</b> | <b>Third Presentation</b>   | Apply    |
|                    | Third Presentation carries on Implementation of Mini Projects                                   |          |
| <b>Activity-12</b> | <b>System Integration</b>   | Apply    |
|                    | Students must integrate the different functional modules to build whole system.                 |          |
| <b>Activity-13</b> | <b>Mini Project Report Preparation</b>  | Apply    |
|                    | Students must prepare the final mini project report.  |          |
| <b>Activity-14</b> | <b>Final Presentation</b>   | Apply    |
|                    | Students must present their mini project work in front of panel of examiner.                    |          |



### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 2   | 2   | 1   | 2   | 2   | 3   | 2   | 2   | 2   | 2    | 1    | 3    |
| <b>CO2</b> | 1   | 2   | 1   | 1   | 2   | 1   | 1   | 2   | 1   | 1    | 1    | 2    |
| <b>CO3</b> | 1   | -   | 3   | 1   | 3   | 1   | 1   | -   | 2   | 2    | -    | 2    |
| <b>CO4</b> | 2   | -   | 2   | 1   | 2   | 1   | -   | -   | 2   | 1    | -    | 2    |
| <b>CO5</b> | 1   | -   | -   | -   | 2   | -   | 1   | -   | 2   | 2    | -    | 2    |



**23UG-PCC-CSE403P –Computer Networks Lab**[Click for Syllabus Structure](#)

**Teaching Scheme**  
**Practical** : 2 Hrs/Week  
**Credits** : 1

**Evaluation Scheme**  
**ISA** : 25 Marks  
**POE** : 50 Marks

| <b>Expt . No.</b> | <b>Experiment</b>  | <b>Tools</b>                               |
|-------------------|--|--|
| 1                 | Setup and Configure a Simple Network using Hubs, Switches, and Routers | Cisco Packet Tracer                        |
| 2                 | Demonstrate Different Network Topologies (Bus, Star, Ring)             | Cisco Packet Tracer                        |
| 3                 | Simulate the OSI Model Layers using Network Simulation Software        | Wireshark, Cisco Packet Tracer             |
| 4                 | Compare the OSI and TCP/IP Models with Real-world Examples             | Wireshark                                  |
| 5                 | Implement Unicast, Multicast, and Broadcast Addressing in a Network    | Cisco Packet Tracer                        |
| 6                 | Perform Bit, Byte, and Character Stuffing for Data Framing             | Custom Python Scripts                      |
| 7                 | Implement CRC and Checksum for Error Detection                         | MATLAB, Custom Python Scripts              |
| 8                 | Demonstrate Hamming Code for Error Correction                          | MATLAB, Custom Python Scripts              |
| 9                 | Implement Stop-and-Wait and Sliding Window Protocols for Flow Control  | Cisco Packet Tracer, Custom Python Scripts |
| 10                | Configure and Analyze Routing Protocols (Distance Vector, Link State)  | Cisco Packet Tracer, GNS3                  |
| 11                | Setup and Test UDP and TCP Connections, Including Port Addressing      | Wireshark, Cisco Packet Tracer             |
| 12                | Configure and Test Application Layer Protocols (DHCP, DNS, HTTP)       | Cisco Packet Tracer                        |





**23UG-A-CSE411 (Audit Course-III) Environment Studies**

[Click for Syllabus Structure](#)

**Teaching Scheme**

**Lectures** : --  
**Credits** : --  
**Tutorials** : --

**Evaluation Scheme**

**ISE** : --  
**ESE** : --  
**ISA** : --

| <b>Course Objective :</b> |   |                         |
|---------------------------|---|-------------------------|
| 1                         | To provides an integrated, quantitative, and interdisciplinary study of environmental systems.  |                         |
| 2                         | To develop a better understanding of human relationships, perceptions, and policies towards the environment.                                    |                         |
| 3                         | To teach students to evaluate alternative energy systems.   |                         |
| 4                         | Covers pollution control and mitigation strategies and educates on natural resource management.   |                         |
| 5                         | Explores the effects of global climate change, helps students bring a systems approach to the analysis of environmental problems                |                         |
| <b>Course Outcomes :</b>  |   |                         |
| <b>COs</b>                | <b>At the end of successful completion of the course, the students will be able to</b>  | <b>Bloom's Taxonomy</b> |
| CO1                       | Identify ecosystems, food chains, food webs, and natural resources  | Understand              |
| CO2                       | Learn the causes, effects, and control methods of water, air, and noise pollution.  | Remember                |
| CO3                       | Describe key environmental laws and international/national efforts for environmental protection.  | Understand              |
| CO4                       | Discuss global warming, alternative energy, sustainable development, disaster management, and the role of IT in environmental and human health. | Understand              |
| CO5                       | Use knowledge and skills to solve environment related problem   | Apply                   |

| <b>Section – I</b> |  |                 |
|--------------------|--|-----------------|
| <b>Unit-1</b>      | <b>Ecology</b>   | <b>04 Hours</b> |
|                    | Ecosystem, Ecological Pyramids, Food Chain, Food Web, Ecological Succession, Natural Resources and Associated Problems. Forest Resources, Water Resources, Mineral Resources, Food Resources, Energy Resources, Land Resources, Role of Individuals in Conservation of Natural Resources.  |                 |
| <b>Unit-2</b>      | <b>Pollution</b>   | <b>10 Hours</b> |
|                    | <b>Water Pollution:</b> Causes, Effects, Control, Drinking Water Quality Standards, Arsenic, Lead, Cadmium, Chromium, Fluoride Contamination & Its Effects, Water Treatment, Wastewater Treatment<br><b>Air Pollution:</b> Causes, Effects, Control, Air Pollution Controlling Equipments, Air Quality Standards, National Air Quality Index, Vehicular Emission, Alternative Fuels, Indoor Air Pollution, Thermal Inversions, |                 |

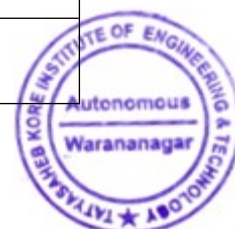


|                     |   |                 |
|---------------------|---|-----------------|
|                     | Photochemical Smog and Acid Precipitation<br><b>Noise Pollution:</b> Causes, Effects, Control, Noise Standards Recommended By CPCB.<br><b>Environmental Protection Act:</b> Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, International and National Efforts for Environmental Protection.  |                 |
| <b>Unit-3</b>       | <b>Waste management</b><br>Solid Waste Management, Biomedical Waste Management, E-Waste, Plastic Waste Management, Hazardous Waste Management, Carbon Footprint, Recycling of Waste, Role of Central Pollution Control Board (CPCB), State Pollution Control Board, and Role Of NGO'S   | <b>04 Hours</b> |
| <b>Section – II</b> |   |                 |
| <b>Unit-4</b>       | <b>Social Issues and Environment</b><br><b>Global Warming:</b> Ozone Layer Depletion, Urban Problems Related To Energy, Alternative Energy Sources.<br><b>Evolution of Sustainable Development:</b> Timeline, Evolution of Green Movements in India.<br><b>Disaster Management:</b> Flood, Earthquakes, Cyclones, Landslides, Draught, Tsunami etc., Swachh Bharat Mission, Role of Information Technology in Environment and Human Health. | <b>06 Hours</b> |

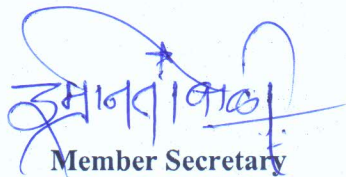
### Mapping of POs & COs:

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | 1   | 1   | 2   | -   | -   | 2   | 3   | 2   | 2   | 1    | 1    | 1    |
| <b>CO2</b> | -   | 1   | -   | -   | -   | 2   | 3   | 1   | 2   | 2    | -    | 2    |
| <b>CO3</b> | -   | -   | -   | 1   | -   | 2   | 2   | -   | 2   | 1    | -    | 2    |
| <b>CO4</b> | 1   | 1   | -   | 1   | -   | 2   | 3   | 1   | 1   | 1    | 2    | 2    |
| <b>CO5</b> | 2   | 2   | 2   | -   | -   | 2   | 2   | -   | 3   | 2    | 3    | 2    |

| <b>References</b>   |   |
|---------------------|---|
| <b>Text Books :</b> |   |
| 1                   | “Environmental Biology” by Agarwal K. C, Nidi publication Ltd., Bikaner 2001  |
| 2                   | A Textbook of Environmental Studies-D.K.Asthana, Meera Asthana-S.Chand Publication, Revised Edition 2006                            |
| 3                   | Basic course in environmental Studies -S. Deswal & A. Deswal, Dhanpat Rai & Co Ltd. Publications, Delhi Second revised edition 2009 |



| Reference Books :   |  |
|---|--|
| 1   | Environmental science – A Study of Inter- Relationships Eldon D Enger, Bradley F. Smith Wm C Brown Publishers 2nd Edition 1989   |
| 2   | Ecology of Natural resources-Francois Ramade, John Wiley & Sons Publication  |
| 3   | John Wiley & Sons -Robert Leo Smith, Harper Collins Publishers,1998  |
| 4   | Introduction to Environmental Engineering & Science-Gilbert M.Masters,Prentice Hall International Inc. Second Edition  |
| SWAYAM Courses (Operational Timestamp: Thu, 25-Jul-2024 on 7:00 AM) |  |
| 1   | NPTEL Course on Environmental Studies   Prof. Orus Ilyas, Dr.Sharad Kumar<br><a href="https://onlinecourses.swayam2.ac.in">https://onlinecourses.swayam2.ac.in</a>   |
| Virtual Lab (Operational Timestamp: Thu, 11-July-2024 on 03:45 PM)  |  |
| 1   | Environmental Engineering Lab<br><a href="https://www.google.com/url?q=https://www.vlab.co.in/broad-area-civil-engineering&amp;sa=D&amp;source=editors&amp;ust=1720509127203847&amp;usg=AOvVaw0Y7RhOxUL2VgcPZbyzDFc3">https://www.google.com/url?q=https://www.vlab.co.in/broad-area-civil-engineering&amp;sa=D&amp;source=editors&amp;ust=1720509127203847&amp;usg=AOvVaw0Y7RhOxUL2VgcPZbyzDFc3</a> |




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TKIET(Autonomous),  
Warananagar



**Principal**  
TKIET(Autonomous),  
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