# K. S. Rangasamy College of Technology

**(Autonomous)**



**CURRICULUM AND SYLLABI**

**FOR**

## B.E. Computer Science and Engineering

## Artificial Intelligence and Machine Learning

**(For the batch admitted in 2022– 2023)**

## R2022

**Courses Accredited by NAAC with A++ Grade,
Approved by AICTE, Affiliated to Anna University, Chennai.**

**KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.**

# Department of Artificial Intelligence and Machine Learning

**VISION**

- To produce competent software professionals, academicians and researchers through Quality Education.

**MISSION**

- To produce competent software developers, system designers and network programmers through innovative teaching-learning practices.

- To keep abreast of the latest developments and technological transformations in computer science and engineering for social benefits.

## Program Educational Objectives (PEOs) for B.E. (AIML) Programme

**PEO1:**

Graduates will provide effective solutions for software and hardware industries by applying the concepts of basic science and engineering fundamentals.

**PEO2:**

Graduates will be professionally competent and successful in their career through life-long learning.

**PEO3:**

Graduates will contribute individually or as member of a team in handling projects and demonstrate social responsibility and professional ethics.

**PROGRAMME OUTCOMES (POs) Engineering Graduates will be able to:**

**PO1:  Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:  Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:  Design /development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:  Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:  Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

**PO6:  The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:  Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:  Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:  Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:  Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:  Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:  Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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# Program Specific Outcomes (PSOs) for B.E.(AIML) Programme

Engineering Graduates will be able to:

**PSO1:** Apply standard Software Engineering practices and strategies in software project development using open-source programming environment and deliver a quality product for business success.

**PSO2:** Analyze and Interpret data by applying advanced data analytic models for decision making in Complex Problems and facilitate inter disciplinary research.

## MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMME OUTCOMES (POs)

The B.E. Artificial Intelligence and Machine Learning Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

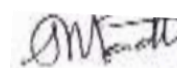| Programme Educational Objectives | Programme Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| PEO1 | 3 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 |
| PEO2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 |
| PEO3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 1 |

Contributions: 1-low, 2- medium, 3-high

### MAPPING-UG- Artificial Intelligence and Machine Learning

| Year | Sem | Course Name | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | I | Professional English-I | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| | | Matrices and Calculus | 3 | 3 | 2.8 | 2.4 | 2.4 | | | | | | | 2 |
| | | Foundation of Artificial Intelligence | 3 | 3 | 1.25 | 3 | 3 | | | 1.5 | | | | 1 |
| | | Engineering Graphics | 3 | 2.6 | 3 | 3 | 3 | 1 | 1 | 1 | | 3 | 1.4 | 3 |
| | | C Programming | 3 | 3 | 3 | | 3 | | | | 2 | 2 | | 2 |
| | | Environmental Studies and Climate Change | 2.8 | 2.8 | 3 | 2.8 | 2.75 | 2.6 | 3 | 3 | 2.2 | 2.2 | 1.8 | 2.8 |
| | | Fabrication and Reverse Engineering Laboratory | 3 | 2.6 | 2.8 | 1.6 | 3 | 2 | 2 | 2.2 | 3 | 2 | 1.6 | 3 |
| | | C Programming Laboratory | 3 | 3 | 3 | | 3 | | | | 2 | 2 | | 2 |
| I | II | Professional English-II | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| | | Linear Algebra and Discrete Mathematics | 3 | 3 | 2.5 | 2.8 | 1.8 | | | | | | 1.5 | 2 |
| | | Physics for Computer Technologist | 3 | 2.8 | 3 | 2.6 | 2.2 | 2.8 | 2.4 | 2 | 2.25 | 1.6 | 2 | 2.6 |
| | | Engineering Chemistry | 2.6 | 2.75 | 2.4 | 2.4 | 2.6 | 2.5 | 2.75 | 2.33 | 2.4 | 2.5 | 2.75 | 2.6 |
| | | Basic Electrical and Electronics Engineering | 2.6 | 2.8 | 1.67 | 1.67 | 2 | 2 | 2.33 | 1.5 | 2 | 2 | 2 | 2.25 |

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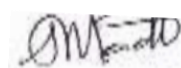
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| Year | Sem | Course | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Python Programming | 3 | 3 | 3 | | 3 | | | | 2 | 2 | 2 | 2 |
| | | NCC/NSS/NSO/YRC/RRC/Fine Arts* | 3 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2.5 |
| | | Heritage of Tamils* | | | | | | 3 | 3 | | 2 | | | 3 |
| | | Engineering Physics and Chemistry Laboratory | 3 | 2.4 | 2.6 | 2.5 | 2.6 | 2.2 | 2.4 | 2 | 2 | 2.3 | 1.6 | 2 |
| | | Python Programming Laboratory | 3 | 3 | 3 | | 3 | | | | 2 | 2 | 2 | 2 |
| | | Career Skill Development I | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| II | III | Probability Analysis and Random Processes | 3 | 3 | 2.6 | 2.4 | | | | | | | 2.4 | 2 |
| | | Data Structures | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | 2 |
| | | Java Programming | 2.6 | 3 | 3 | 2 | 3 | 2 | | 2 | 3 | 3 | 2 | 3 |
| | | Formal Language and Automata Theory | 3 | 2.8 | 2 | 2 | | | | 2 | | 1.5 | 2 | 2 |
| | | Computer Architecture | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | 2 |
| | | Universal Human Values* | | | | | 3 | 3 | 3 | 2.8 | 3 | 2 | | 3 |
| | | Tamils and Technology/ தமிழரும் தொழில் நுட்பமும்* | | | | | | 3 | 3 | | 2 | | | 3 |
| | | Data Structures Laboratory | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 |
| | | Java Programming Laboratory | 2.6 | 3 | 3 | 2 | 3 | 2 | | 2 | 3 | 3 | 2 | 3 |
| | | Career Skill Development – II | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| II | IV | Inferential Statistics and Numerical Methods | 3 | 3 | 2.6 | 2.6 | 2 | | | | | | | 3 |
| | | Design and Analysis of Algorithms | 3 | 3 | 3 | 2 | 3 | | | | | 2 | | |
| | | Artificial Intelligence | 3 | 2.6 | 2 | 2 | 2 | 2 | | | | | | 2.4 |
| | | Software Engineering | 3 | 3 | 2.8 | 2.6 | 3 | | 2 | 2 | 2.5 | 2.3 | 3 | 3 |
| | | Database Management Systems | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | 2 |
| | | Open Elective I | | | | | | | | | | | | |
| | | Start-ups and Entrepreneurship | 2.8 | 2.6 | 3 | 2.4 | 2.2 | 2.5 | 1.6 | 1.7 | 1.3 | 2 | 2.2 | 2.4 |
| | | Artificial Intelligence Laboratory | 3 | 2.6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.4 |
| | | Database Management Systems Laboratory | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 |
| | | Career Skill Development III | 2.6 | 2.6 | 2.6 | 2.8 | | 2.4 | | | | 2 | 3 | 3 |
| III | V | Machine Learning | 2 | 2.2 | 3 | 2.2 | 2 | 2.6 | | 2 | | | | 2 |
| | | Operating System | 3 | 2.6 | 2.8 | 3 | | | 2 | | | 2 | | 2.2 |
| | | Computer Networks | 2.8 | 2.8 | | 2 | 2.3 | | 2 | 2.5 | 2.5 | 2.5 | | 2 |
| | | Design Thinking | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2.6 | 2 | 3 | 2.4 |
| | | Elective I | | | | | | | | | | | | |
| | | Open Elective II | | | | | | | | | | | | |

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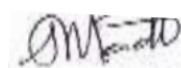
BoS Chairman

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Machine Learning Laboratory | 2 | 2.2 | 3 | 2.2 | 2 | 2.6 | | 2 | | | | 2 |
| | | Design Thinking Laboratory | 2 | 2.2 | 3 | 2.2 | 2 | 2.5 | | 2 | | | | 2 |
| | | Career Skill Development IV | | | | | | | | | | | | |
| | | Internship | | | | | | | | | | | | |
| III | VI | Data and Visual Analytics in AI | 2.4 | 2 | 2.8 | 2 | 3 | 1.7 | 1 | 1 | 2 | 2.3 | 1.3 | |
| | | Deep Learning | 3 | 2 | 3 | 3 | | | | | 3 | 3 | 2 | 3 |
| | | Web Technology | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 |
| | | Elective II | | | | | | | | | | | | |
| | | Elective III | | | | | | | | | | | | |
| | | Open Elective III | | | | | | | | | | | | |
| | | Data and Visual Analytics in AI Laboratory | 2.4 | 2 | 2.8 | 2 | 3 | 1.7 | 1 | 1 | 2 | 2.3 | 1.3 | |
| | | Deep Learning Laboratory | 3 | 3 | 3 | 2.6 | 3 | 2.3 | | | 3 | 3 | 2 | 3 |
| | | Comprehensive Test | | | | | | | | | | | | |
| | | Internship | | | | | | | | | | | | |

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# K.S.RANGASAMY COLLEGE OF TECHNOLOGY

## Credit Distribution for B.E (AIML) Programme–2022 –2023 Batch

| S.No. | Category | Credits Per Semester | | | | | | | | Total Credits | Percentage % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | | |
| 1. | HS | 2 | 2 | - | - | - | - | - | - | 04 | 2.44 |
| 2. | BS | 4 | 12 | 4 | 4 | - | - | - | - | 24 | 14.63 |
| 3. | ES | 14 | 3 | - | - | - | - | - | - | 17 | 10.37 |
| 4. | PC | - | 6 | 15 | 16 | 17 | 13 | 16 | - | 85 | 50.61 |
| 5. | PE | - | - | - | - | 3 | 6 | 3 | 3 | 15 | 9.14 |
| 6. | OE | - | - | - | 3 | 3 | 3 | - | - | 9 | 5.49 |
| 7. | CG | - | - | - | - | - | - | 2 | 8 | 12 | 7.32 |
| 8. | MC | MCI | - | MCII | MCIII | - | - | - | - | - | - |
| 9. | AC | - | - | - | - | - | - | ACI | ACII | - | - |
| Total | | 20 | 23 | 21 | 23 | 23 | 22 | 21 | 11 | 164 | 100 |

**\*** General Elective – Extra credit is offered

**HS – HUMANITIES AND SOCIAL SCIENCES**
**BS – BASIC SCIENCE**
**ES – ENGINEERING SCIENCES**
**PC – PROFESSIONAL CORE**
**PE – PROFESSIONAL ELECTIVES**
**MC – MANDATORY COURSES**
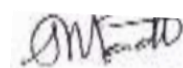**AC – AUDIT COURSES**
**OE – OPEN ELECTIVES**
**CG – CAREER GUIDANCE COURSES**

- Open Electives are courses offered by different departments that do not have any pre requisites and could be of interest to students of any branch

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE -637215
(An Autonomous Institution affiliated to Anna University)

# CONCEIVE DEVELOP IMPLEMENT EXECUTE (CDIE)

## HUMANITIES AND SOCIAL SCIENCE (HS)

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|--------------|
| 1. | 60 EN 001 | Professional English-I | HS | 3 | 1 | 0 | 2 | 2 | Basic knowledge of reading and writing in English |
| 2. | 60 EN 002 | Professional English-II | HS | 3 | 1 | 0 | 2 | 2 | Basic knowledge of reading and writing in English and should have completed Professional English I |

## BASIC SCIENCE (BS)
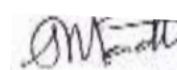
| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|--------------|
| 1. | 60 MA 001 | Matrices and Calculus | BS | 4 | 3 | 1 | 0 | 4 | NIL |
| 2. | 60 MA 006 | Linear Algebra and Discrete Mathematics | BS | 4 | 3 | 1 | 0 | 4 | NIL |
| 3. | 60 PH 004 | Physics for Computer Technology | BS | 3 | 3 | 0 | 0 | 3 | NIL |
| 4. | 60 CH 004 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 | NIL |
| 5. | 60 CP 0P2 | Engineering Physics and Chemistry Laboratory | BS | 4 | 0 | 0 | 4 | 2 | NIL |
| 6. | 60 MA 014 | Probability and Random Processes | BS | 4 | 3 | 1 | 0 | 4 | |
| 7. | 60 MA 020 | Inferential Statistics and Numerical Methods | BS | 4 | 3 | 1 | 0 | 4 | |

## ENGINEERING SCIENCES (ES)

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|--------------|
| 1. | 60 AD 001 | Foundations of Artificial Intelligence | ES | 3 | 3 | 0 | 0 | 3 | NIL |
| 2. | 60 ME 002 | Engineering Graphics | ES | 6 | 2 | 0 | 4 | 4 | NIL |
| 3. | 60 CS 001 | C Programming | ES | 3 | 3 | 0 | 0 | 3 | NIL |
| 4. | 60 CS 0P1 | C Programming Laboratory | ES | 4 | 0 | 0 | 4 | 2 | NIL |
| 5. | 60 ME 0P1 | Fabrication and Reverse Engineering Laboratory | ES | 4 | 0 | 0 | 4 | 2 | NIL |

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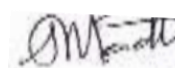
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| 6. | 60 EE 001 | Basic Electrical and Electronics Engineering | ES | 3 | 3 | 0 | 0 | 3 | NIL |
|----|-----------|------|----|----|----|----|----|----|----|

## PROFESSIONAL CORE (PC)

| S. No | Couse Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|-------|-----------|--------------|----------|-----------------|---|---|---|---|--------------|
| 1. | 60 IT 001 | Python Programming | PC | 4 | 3 | 1 | 0 | 4 | Basic Knowledge of mathematics and programming |
| 2. | 60 IT 0P1 | Python Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic Knowledge of mathematics and programming |
| 3. | 60 CS 003 | Data Structures | PC | 3 | 3 | 0 | 0 | 3 | Basic knowledge of mathematics and programming language in C |
| 4. | 60 CS 004 | Java Programming | PC | 3 | 3 | 0 | 0 | 3 | Basic knowledge of any programming language with ability to solve logical problems |
| 5. | 60 AM 301 | Formal Language and Automata Theory | PC | 4 | 3 | 1 | 0 | 4 | Basic Knowledge of mathematics and Computer Systems |
| 6. | 60 AM 302 | Computer Architecture | PC | 3 | 3 | 0 | 0 | 3 | Basic knowledge of Software and Hardware |
| 7. | 60 CS 0P3 | Data Structures Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic knowledge of mathematics and programming language in C |
| 8. | 60 CS 0P4 | Java Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic knowledge of any programming language with |

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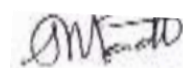
Approved in Academic Council Meeting held on 23/12/23
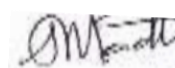
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| S. No | Couse Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ability to solve logical problems |
| 9. | 60 IT 002 | Design and Analysis of Algorithms | PC | 3 | 3 | 0 | 0 | 3 | Basic knowledge of Data Structures and Computer programming |
| 10. | 60 AM 401 | Artificial Intelligence | PC | 3 | 3 | 0 | 0 | 3 | Basic knowledge of Computer programming and algorithms |
| 11. | 60 AM 402 | Software Engineering | PC | 4 | 2 | 0 | 2 | 3 | Nil |
| 12. | 60 AM 403 | Database Management Systems | PC | 3 | 3 | 0 | 0 | 3 | Basic Knowledge of Data Storage and Management |
| 13. | 60 AM 4P1 | Artificial Intelligence Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Students will benefit from a good background in probability, algebra, calculus and programming |
| 14. | 60 AM 4P2 | Database Management Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic Knowledge of Data Storage and Management |
| 15. | 60 AM 501 | Machine Learning | PC | 3 | 3 | 0 | 0 | 3 | Students will benefit from a good background in probability, algebra, calculus and programming. |
| 16. | 60 AM 502 | Operating Systems | PC | 5 | 3 | 0 | 2 | 4 | Basic Knowledge of Data Storage and Management |
| 17. | 60 AM 503 | Computer Networks | PC | 3 | 3 | 0 | 0 | 3 | Basic Knowledge of programming |

| S. No | Couse Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | and architecture |
| 18. | 60 AM 504 | Design Thinking | PC | 3 | 3 | 0 | 0 | 3 | |
| 19. | 60 AM 5P1 | Machine Learning Laboratory | PC | 4 | 0 | 0 | 4 | 2 | |
| 20. | 60 AM 5P2 | Design Thinking Laboratory | PC | 4 | 0 | 0 | 4 | 2 | |
| 21. | 60 AM 601 | Data and Visual Analytics in AI | PC | 3 | 3 | 0 | 0 | 3 | Basic Knowledge of Artificial Intelligence |
| 22. | 60 AM 602 | Deep Learning | PC | 3 | 3 | 0 | 0 | 3 | Basic Knowledge of Machine Learning |
| 23. | 60 AM 603 | Web Technology | PC | 4 | 1 | 0 | 3 | 3 | |
| 24. | 60 AM 6P1 | Data and Visual Analytics in AI Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic knowledge of Artificial Intelligence |
| 25. | 60 AM 6P2 | Deep Learning Laboratory | PC | 4 | 0 | 0 | 4 | 2 | Basic knowledge of Artificial Intelligence |
| 26. | 60 AM 701 | Big Data Framework | PC | 3 | 3 | 0 | 0 | 3 | |
| 27. | 60 AM 702 | Natural Language Processing | PC | 3 | 3 | 0 | 0 | 3 | |
| 28. | 60 AM 703 | Basics of Computer Vision | PC | 3 | 3 | 0 | 0 | 3 | |
| 29. | 60 AM 704 | Business Analytics | PC | 3 | 3 | 0 | 0 | 3 | |
| 30. | 60 AM 7P1 | Natural Language Processing Laboratory | PC | 4 | 0 | 0 | 4 | 2 | |
| 31. | 60 AM 7P2 | Big Data Laboratory | PC | 4 | 0 | 0 | 4 | 2 | |

## PROFESSIONAL ELECTIVES
## SEMESTER V, ELECTIVE I

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM E11 | Solve Business Problems with AI | PE | 3 | 3 | 0 | 0 | 3 | |

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| 2. | 60 AM E12 | Big Data Analytics | PE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM E13 | Statistical Thinking for Data Science | PE | 3 | 3 | 0 | 0 | 3 | |
| 4. | 60 AM E14 | Optimization Techniques in Machine Learning | PE | 3 | 3 | 0 | 0 | 3 | |
| 5. | 60 AM E15 | Internet of Things | PE | 3 | 3 | 0 | 0 | 3 | |
| 6. | 60 AM E16 | Generative AI | PE | 3 | 3 | 0 | 0 | 3 | |

## SEMESTER VI, ELECTIVE II
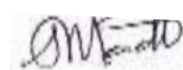
| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM E21 | Artificial Intelligence in Gaming | PE | 3 | 3 | 0 | 0 | 3 | |
| 2. | 60 AM E22 | Predictive Analysis | PE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM E23 | Artificial Intelligence in Healthcare | PE | 3 | 3 | 0 | 0 | 3 | |
| 4. | 60 AM E24 | Genome Sequencing | PE | 3 | 3 | 0 | 0 | 3 | |
| 5. | 60 AM E25 | Algorithms for DNA Sequencing | PE | 3 | 3 | 0 | 0 | 3 | |
| 6. | 60 AM E26 | Bioinformatics | PE | 3 | 3 | 0 | 0 | 3 | |

## SEMESTER VI, ELECTIVE III

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM E31 | Soft Computing | PE | 3 | 3 | 0 | 0 | 3 | |
| 2. | 60 AM E32 | Computational Neuroscience | PE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM E33 | Artificial Intelligence in Finance | PE | 3 | 3 | 0 | 0 | 3 | |
| 4. | 60 AM E34 | Machine Learning with Python | PE | 3 | 3 | 0 | 0 | 3 | |
| 5. | 60 AM E35 | Advanced Machine Learning | PE | 3 | 3 | 0 | 0 | 3 | |
| 6. | 60 AM E36 | Professional Readiness for Innovation, Employability and Entrepreneurship | PE | 0 | 0 | 0 | 6 | 3 | |

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## SEMESTER VII, ELECTIVE IV

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM E41 | Introduction to Augmented Reality and AR Core | PE | 3 | 3 | 0 | 0 | 3 | |
| 2. | 60 AM E42 | Data Analytics for Industry 4.0 | PE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM E43 | Design of Artificial Intelligence Products | PE | 3 | 3 | 0 | 0 | 3 | |
| 4. | 60 AM E44 | Foundation of Block chain | PE | 3 | 3 | 0 | 0 | 3 | |
| 5. | 60 AM E45 | Kernel Methods for Machine Learning | PE | 3 | 3 | 0 | 0 | 3 | |
| 6. | 60 AM E46 | Ethics of Artificial Intelligence | PE | 3 | 3 | 0 | 0 | 3 | |

## SEMESTER VIII, ELECTIVE V

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM E51 | Business Intelligence | PE | 3 | 3 | 0 | 0 | 3 | |
| 2. | 60 AM E52 | Geographical Information Analysis | PE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM E53 | Data Centric Computing | PE | 3 | 3 | 0 | 0 | 3 | |
| 4. | 60 AM E54 | Game theory for Decision Analysis | PE | 3 | 3 | 0 | 0 | 3 | |
| 5. | 60 AM E55 | Image and Video Analytics | PE | 3 | 3 | 0 | 0 | 3 | |
| 6. | 60 AM E56 | Web Information Search and Management | PE | 3 | 3 | 0 | 0 | 3 | |

## SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)
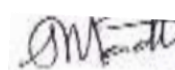
| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AC 001 | Research Methodology– I | AC | 1 | 1 | 0 | 0 | 0 | |
| 2. | 60 AC 002 | Research Methodology –II | AC | 1 | 1 | 0 | 0 | 0 | |

## MANDATORY COURSES (MC)

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 MY 001 | Environmental Studies and Climate Change | MC | 2 | 2 | 0 | 0 | 0 | |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2. | 60 MY 002 | Universal Human Values | MC | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 MY 003 | Start-ups and Entrepreneurship | MC | 2 | 2 | 0 | 0 | 0 | |

## OPEN ELECTIVES I / II / III (OE)

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 AM L01 | Robotics | OE | 3 | 3 | 0 | 0 | 3 | |
| 2. | 60 AM L02 | Image and Video Processing | OE | 3 | 3 | 0 | 0 | 3 | |
| 3. | 60 AM L03 | Machine Learning for Data Science | OE | 3 | 3 | 0 | 0 | 3 | |
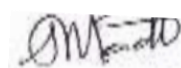
## CAREER GUIDANCE COURSES (CG)

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C | Prerequisite |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 60 CG 0P1 | Career Skill Development I | CG | 2 | 0 | 0 | 2 | 1* | Basic knowledge of reading and writing in English. |
| 2. | 60 CG 0P2 | Career Skill Development II | CG | 2 | 0 | 0 | 2 | 1* | |
| 3. | 60 CG 0P3 | Career Skill Development III | CG | 2 | 0 | 0 | 2 | 1* | |
| 4. | 60 CG 0P4 | Career Skill Development IV | CG | 2 | 0 | 0 | 2 | 1* | |
| 5. | 60 CG 0P5 | Comprehensive Test | CG | 2 | 0 | 0 | 2 | 1* | |
| 6. | 60 CG 0P6 | Internship * | CG | - | 0 | 0 | 0 | 3* | |
| 7. | 60 AM 7P3 | Project Work – Phase I | CG | 4 | 0 | 0 | 4 | 2 | |
| 8. | 60 AM 8P1 | Project Work – Phase II | CG | 16 | 0 | 0 | 16 | 8 | |

* Internship – Extra credit is offered

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# K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE -637215

**(An Autonomous Institution affiliated to Anna University)**

**COURSES OF STUDY**

**(For the candidates admitted from 2022-2023 onwards)**

## SEMESTER I

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| | | Induction Programme | - | - | - | - | - | - |
| **THEORY** | | | | | | | | |
| 1. | 60 EN 001 | Professional English-I | HS | 3 | 1 | 0 | 2 | 2 |
| 2. | 60 MA 001 | Matrices and Calculus | BS | 4 | 3 | 1 | 0 | 4 |
| 3. | 60 AD 001 | Foundations of Artificial Intelligence | ES | 3 | 3 | 0 | 0 | 3 |
| 4. | 60 ME 002 | Engineering Graphics | ES | 6 | 2 | 0 | 4 | 4 |
| 5. | 60 CS 001 | C Programming | ES | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 MY 001 | Environmental Studies and Climate Change | MC | 2 | 2 | 0 | 0 | 0 |
| **PRACTICALS** | | | | | | | | |
| 7. | 60 CS 0P1 | C Programming Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 8. | 60 ME 0P1 | Fabrication and Reverse Engineering Laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| | | | **Total** | **29** | **14** | **01** | **14** | **20** |

**I to VII semester**

NCC [%] - Course can be waived with 3 credits in VII semester or offered as extra credits
NSS/NSO/YRC/RRC/Fine Arts [%] 3 credits is not accounted for CGPA
Career Skill Development (CSD) - additional credit is offered not accounted for CGPA.
**I to VIII semester**
Internship 3 additional credits not accounted for CGPA is offered based on the Internship duration
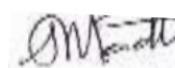
## SEMESTER II

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1 | 60 EN 002 | Professional English-II | HS | 3 | 1 | 0 | 2 | 2 |
| 2 | 60 MA 006 | Linear Algebra and Discrete Mathematics | BS | 4 | 3 | 1 | 0 | 4 |
| 3 | 60 PH 004 | Physics for Computer Technology | BS | 3 | 3 | 0 | 0 | 3 |
| 4 | 60 CH 004 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 5 | 60 EE 001 | Basic Electrical and Electronics Engineering | ES | 3 | 3 | 0 | 0 | 3 |

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BoS Chairman

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| 6 | 60 IT 001 | Python Programming | PC | 4 | 3 | 1 | 0 | 4 |
| 7 | 60 GE 001 | Heritage of Tamils தமிழர் மரபு* | GE | 1 | 1 | 0 | 0 | 1* |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 CP 0P2 | Engineering Physics and Chemistry Laboratory | BS | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 IT 0P1 | Python Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 CG 0P1 | Career Skill Development I | CG | 2 | 0 | 0 | 2 | 1* |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1/2/3* |
| | | | **Total** | **31** | **17** | **02** | **12** | **23** |

Heritage of Tamils & additional 1 credit is offered and not account for CGPA.
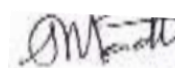
## SEMESTER III

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 60 MA 014 | Probability and Random Processes | BS | 4 | 3 | 1 | 0 | 4 |
| 2. | 60 CS 003 | Data Structures | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | 60 CS 004 | Java Programming | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 60 AM 301 | Formal Language and Automata Theory | PC | 4 | 3 | 1 | 0 | 4 |
| 5. | 60 AM 302 | Computer Architecture | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 MY 002 | Universal Human Values* | MC | 3 | 3 | 0 | 0 | 3* |
| 7. | 60 GE 002 | Tamils and Technology/ தமிழரும் தொழில்நுட்பமும்* | GE | 1 | 1 | 0 | 0 | 1* |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 CS 0P3 | Data Structures Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 CS 0P4 | Java Programming Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 CG 0P2 | Career Skill Development II | CG | 2 | 0 | 0 | 2 | 1* |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1/2/3* |
| | | | **Total** | **31** | **19** | **02** | **10** | **21** |

· Tamils and Technology & additional1 credit is offered and not account for CGPA.
· UHV # additional 3 credit is offered and not accounted for CGPA

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## SEMESTER IV
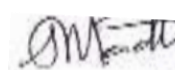
| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 60 MA 020 | Inferential Statistics and Numerical Methods | BS | 4 | 3 | 1 | 0 | 4 |
| 2. | 60 IT 002 | Design and Analysis of Algorithms | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | 60 AM 401 | Artificial Intelligence | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 60 AM 402 | Software Engineering | PC | 4 | 2 | 0 | 2 | 3 |
| 5. | 60 AM 403 | Database Management Systems | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 ** L1* | Open Elective I | OE | 3 | 3 | 0 | 0 | 3 |
| 7. | 60 MY 003 | Start-ups and Entrepreneurship | MC | 2 | 2 | 0 | 0 | 0 |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 AM 4P1 | Artificial Intelligence Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 AM 4P2 | Database Management Systems Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 CG 0P3 | Career Skill Development III | CG | 2 | 0 | 0 | 2 | 1* |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1/2/3* |
| | | | **Total** | **32** | **19** | **01** | **12** | **23** |

## SEMESTER V

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 60 AM 501 | Machine Learning | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | 60 AM 502 | Operating System | PC | 5 | 3 | 0 | 2 | 4 |
| 3. | 60 AM 503 | Computer Networks | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 60 AM 504 | Design Thinking | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | 60 AM E1* | Elective I | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 ** L2* | Open Elective II | OE | 3 | 3 | 0 | 0 | 3 |
| 7. | 60 AB 00* | NCC/NSS/NSO/YRC/RRC/Fine | - | 4! | 2! | 0 | 2! | 3! |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 AM 5P1 | Machine Learning Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 AM 5P2 | Design Thinking Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 CG 0P4 | Career Skill Development IV | CG | 2 | 0 | 0 | 2 | 1* |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1* |
| | | | **Total** | **31** | **17** | **01** | **14** | **23** |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

## SEMESTER VI

| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 60 AM 601 | Data and Visual Analytics in AI | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | 60 AM 602 | Deep Learning | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | 60 AM 603 | Web Technology | PC | 4 | 1 | 0 | 3 | 3 |
| 4. | 60 AM E2* | Elective II | PE | 3 | 3 | 0 | 0 | 3 |
| 5. | 60 AM E3* | Elective III | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 ** L3* | Open Elective III | OE | 3 | 3 | 0 | 0 | 3 |
| 7. | 60 AB 00* | NCC/NSS/NSO/YRC/RRC/Fine | - | $4^!$ | $2^!$ | 0 | $2^!$ | $3^!$ |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 AM 6P1 | Data and Visual Analytics in AI Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 AM 6P2 | Deep Learning Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 CG 0P5 | Comprehensive Test | CG | 2 | 0 | 1 | 0 | 1 |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1/2/ |
| | | | **Total** | **33** | **16** | **01** | **15** | **22** |

Comprehension Test* -one additional credit is offered and not accounted for CGPA calculation.

Mini project& - 1 additional credit is offered and not accounted for CGPA calculation

## SEMESTER VII
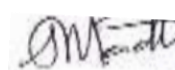
| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 60 AM 701 | Big Data Framework | PC | 3 | 3 | 0 | 0 | 3 |
| 2. | 60 AM 702 | Natural Language Processing | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | 60 AM 703 | Basics of Computer Vision | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 60 AM 704 | Business Analytics | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | 60 AM E4* | Elective IV | PE | 3 | 3 | 0 | 0 | 3 |
| 6. | 60 AC 001 | Research Methodology - I | AC | 1 | 1 | 0 | 0 | 0 |
| 7. | 60 AB 00* | NCC/NSS/NSO/YRC/RRC/Fine | - | $4^!$ | $2^!$ | 0 | $2^!$ | $3^!$ |
| **PRACTICALS** | | | | | | | | |
| 8. | 60 AM 7P1 | Natural Language Processing Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 60 AM 7P2 | Big Data Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 10. | 60 AM 7P3 | Project Work - Phase I | CG | 4 | 0 | 0 | 4 | 2 |
| 11. | 60 CG 0P6 | Internship | CG | - | - | - | - | 1/2/3* |
| | | | **Total** | **28** | **16** | **0** | **12** | **21** |

NCC % - Course can be waived with 3 credits in VII semester or offered as extra 3 credits.

NSS/NSO/YRC/RRC/Fine Arts % 3 extra credits not accounted for CGPA

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BoS Chairman

**SEMESTER VIII**

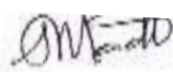| S.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|-------|-------------|--------------|----------|-----------------|---|---|---|---|
| THEORY | | | | | | | | |
| 1. | 60 AM E5* | Elective V | PE | 3 | 3 | 0 | 0 | 3 |
| 2. | 60 AC 002 | Research Methodology - II | AC | 1 | 1 | 0 | 0 | 0 |
| PRACTICALS | | | | | | | | |
| 3. | 60 AM 8P1 | Project Work - Phase II | CG | 16 | 0 | 0 | 16 | 8 |
| | | | Total | 20 | 4 | 0 | 16 | 11 |

**Total number of credits to be earned for award of the degree: 164**

**Note**:

HS - Humanities and Social Sciences including Management Courses, BS - Basic Science Courses, ES - Engineering Science Courses, PE - Professional Core Courses, PE - Professional Elective Courses, OE - Open Elective Courses, CG – Career Guidance Courses, AC - Audit Courses & MC - Mandatory Courses

L : Lecture
T : Tutorial
P : Practical
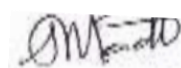
1 Hour Lecture is equivalent to 1 credit

2 Hour Tutorial is equivalent to 1 credit

2 Hours Practical is equivalent to 1 credit

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BoS Chairman

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

**SCHEME OF EXAMINATIONS**
(For the candidates admitted from 2022-2023 onwards)

**FIRST SEMESTER**
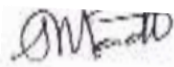
| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | Max. Marks | End Semester Exam | Total |
| **THEORY** | | | | | | | | |
| 1 | 60 EN 001 | Professional English-I | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 MA 001 | Matrices and Calculus | 2 | 40 | 60 | 100 | 45 | 100 |
| 3 | 60 AD 001 | Foundations of Artificial Intelligence | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 ME 002 | Engineering Graphics | 2 | 50 | 50 | 100 | 45 | 100 |
| 5 | 60 CS 001 | C Programming | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 MY 001 | Environmental Studies and Climate Change | 2 | 100 | - | 100 | 45 | 100 |
| **PRACTICAL** | | | | | | | | |
| 7 | 60 CS 0P1 | C Programming Laboratory | 2 | 60 | 40 | 100 | 45 | 100 |
| 8 | 60 ME 0P1 | Fabrication and Reverse Engineering Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

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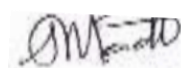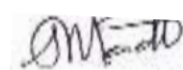Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

# SECOND SEMESTER

| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | Max. Marks | End Semester Exam | Total |
| THEORY | | | | | | | | |
| 1 | 60 EN 002 | Professional English-II | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 MA 006 | Linear Algebra and Discrete Mathematics | 2 | 40 | 60 | 100 | 45 | 100 |
| 3 | 60 PH 004 | Physics for Computer Technology | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 CH 004 | Engineering Chemistry | 2 | 40 | 60 | 100 | 45 | 100 |
| 5 | 60 EE 001 | Basic Electrical and Electronics Engineering | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 IT 001 | Python Programming | 2 | 40 | 60 | 100 | 45 | 100 |
| 7 | 60 AB 00* | NCC/NSS/NSO/ YRC/RRC/Fine | 2 | 40 | 60 | 100 | 45 | 100 |
| PRACTICAL | | | | | | | | |
| 8 | 60 CP 0P2 | Engineering Physics and Chemistry Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |
| 9 | 60 IT 0P1 | Python Programming Laboratory | 2 | 60 | 40 | 100 | 45 | 100 |

\*   CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

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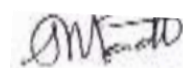
BoS Chairman

# THIRD SEMESTER

| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | Max. Marks | End Semester Exam | Total |
| **THEORY** | | | | | | | | |
| 1 | 60 MA 014 | Probability and Random Processes | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 CS 003 | Data Structures | 2 | 40 | 60 | 100 | 45 | 100 |
| 3 | 60 CS 004 | Java Programming | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 AM 301 | Formal Language and Automata Theory | 2 | 40 | 60 | 100 | 45 | 100 |
| 5 | 60 AM 302 | Computer Architecture | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 MY 002 | Universal Human Values* | 2 | 40 | 60 | 100 | 45 | 100 |
| 7 | 60 GE 002 | Tamils and Technology/ தமிழரும் தொழில்நுட்பமும்* | 2 | 40 | 60 | 100 | 45 | 100 |
| **PRACTICAL** | | | | | | | | |
| 8 | 60 CS 0P3 | Data Structures Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |
| 9 | 60 CS 0P4 | Java Programming Laboratory | 2 | 60 | 40 | 100 | 45 | 100 |

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

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Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

# FOURTH SEMESTER

| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | Max. Marks | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | | End Semester Exam | Total |
| THEORY | | | | | | | | |
| 1 | 60 MA 020 | Inferential Statistics and Numerical Methods | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 IT 002 | Design and Analysis of Algorithms | 2 | 40 | 60 | 100 | 45 | 100 |
| 3 | 60 AM 401 | Artificial Intelligence | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 AM 402 | Software Engineering | 2 | 50 | 50 | 100 | 45 | 100 |
| 5 | 60 AM 403 | Database Management Systems | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 ** L1* | Open Elective I | 2 | 40 | 60 | 100 | 45 | 100 |
| 7 | 60 MY 003 | Start-ups and Entrepreneurship | 2 | 40 | 60 | 100 | 45 | 100 |
| PRACTICAL | | | | | | | | |
| 8 | 60 AM 4P1 | Artificial Intelligence Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |
| 9 | 60 AM 4P2 | Database Management Systems Laboratory | 2 | 60 | 40 | 100 | 45 | 100 |

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.
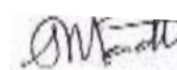
\** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

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BoS Chairman

**FIFTH SEMESTER**

| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | Max. Marks | End Semester Exam | Total |
| **THEORY** | | | | | | | | |
| 1 | 60 AM 501 | Machine Learning | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 AM 502 | Operating System | 2 | 50 | 50 | 100 | 45 | 100 |
| 3 | 60 AM 503 | Computer Networks | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 AM 504 | Design Thinking | 2 | 40 | 60 | 100 | 45 | 100 |
| 5 | 60 AM E1* | Elective I | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 ** L2* | Open Elective II | 2 | 40 | 60 | 100 | 45 | 100 |
| 7 | 60 AB 00* | NCC/NSS/NSO/YRC/RRC/Fine Arts* | 2 | 100 | - | 100 | 45 | 100 |
| **PRACTICAL** | | | | | | | | |
| 8 | 60 AM 5P1 | Machine Learning Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |
| 9 | 60 AM 5P2 | Design Thinking Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

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## SIXTH SEMESTER

| S.No. | Course Code | Name of the Course | Duration of Internal Exam | Weightage of Marks | | | Minimum Marks for Pass in End Semester Exam | |
|---|---|---|---|---|---|---|---|---|
| | | | | Continuous Assessment * | End Semester Exam ** | Max. Marks | End Semester Exam | Total |
| **THEORY** | | | | | | | | |
| 1 | 60 AM 601 | Data and Visual Analytics in AI | 2 | 40 | 60 | 100 | 45 | 100 |
| 2 | 60 AM 602 | Deep Learning | 2 | 40 | 60 | 100 | 45 | 100 |
| 3 | 60 AM 603 | Web Technology | 2 | 40 | 60 | 100 | 45 | 100 |
| 4 | 60 AM E2* | Elective II | 2 | 40 | 60 | 100 | 45 | 100 |
| 5 | 60 AM E3* | Elective III | 2 | 40 | 60 | 100 | 45 | 100 |
| 6 | 60 ** L3* | Open Elective III | 2 | 40 | 60 | 100 | 45 | 100 |
| 7 | 60 AB 00* | NCC/NSS/NSO/YRC/RRC/Fine Arts* | 2 | 100 | - | 100 | 45 | 100 |
| **PRACTICAL** | | | | | | | | |
| 8 | 60 AM 6P1 | Data and Visual Analytics in AI Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |
| 9 | 60 AM 6P2 | Deep Learning Laboratory | 3 | 60 | 40 | 100 | 45 | 100 |

\*   CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

| | | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| **60 EN 001** | **PROFESSIONAL ENGLISH- I** | | HS | 1 | 0 | 2 | 2 |

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**Objective**

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

**Prerequisite**

Basic knowledge of reading and writing in English.

**Course Outcomes**

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

| CO1 | Listen and comprehend complex academic texts | Understand |
|-----|----------------------------------------------|------------|
| CO2 | Read and infer the denotative and connotative meanings of technical texts | Analyze |
| CO3 | Write definitions, descriptions, narrations, and essays on various topics | Apply |
| CO4 | Speak fluently and accurately in formal and informal communicative contexts | Apply |
| CO5 | Express their opinions effectively in both oral and written medium of communication | Analyze |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-------|-------|
| CO1 |     |     |     |     |     |     |     | 2   | 3   | 3    | 2    | 3    | 2     | 3     |
| CO2 |     |     |     |     |     |     |     | 2   | 3   | 3    | 2    | 3    | 2     | 3     |
| CO3 |     |     |     |     |     |     |     | 2   | 3   | 3    | 2    | 3    | 2     | 3     |
| CO4 |     |     |     |     |     |     |     | 2   | 3   | 3    | 2    | 3    | 2     | 3     |
| CO5 |     |     |     |     |     |     |     | 2   | 3   | 3    | 2    | 3    | 2     | 3     |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |
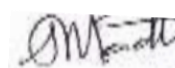
**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination(Marks) |
|------------------|------|------|----------------------------|
|                  | 1    | 2    |                            |
| Remember (Re)    | 10   | 10   | 10                         |
| Apply (Ap)       | 20   | 20   | 40                         |
| Analyse (An)     | 30   | 30   | 50                         |
| Create (Cr)      | 0    | 0    | 0                          |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 60 EN 001 – Professional English I | | | | | | | |
| Common to all Branches | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| I | 1 | 0 | 2 | 45 | 2 | 40 | 60 | 100 |

**Introduction to Fundamentals of Communication**

**Listening:** General information-specific details-conversation: introduction to classmates – audio / video (formal & informal).

**Speaking:** Self Introduction; Introducing a friend; conversation - politeness strategies.

**Reading:** Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails.

**Writing:** Writing letters – informal and formal – basics and format orientation

**Language Focus:** Present Tenses; word formation (affixes); synonyms, antonyms and contranyms, and phrasal verbs; abbreviations & acronyms (as used in technical contexts).

**[9]**

**Narration and Summation**

**Listening:** Podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities.

**Speaking:** Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews.

**Reading:** Biographies, travelogues, newspaper reports, excerpts from literature, and travel & technical blogs.

**Writing:** Paragraph writing, short report on an event (field trip etc.).

**Language Focus:** Past tenses and prepositions; One-word substitution.

**[9]**

**Description of a process / product**

**Listening:** Listen to a product and process descriptions; advertisements about products or services

**Speaking:** Picture description; giving instruction to use the product; presenting a product.

**Reading:** Advertisements, gadget reviews and user manuals.

**Writing:** Definitions; instructions; and product /process description.

**Language Focus:** Imperatives; comparative adjectives; future tenses. Homonyms; and Homophones, discourse markers (connectives & sequence words)

**[9]**

**Classification and Recommendations**

**Listening:** TED Talks; scientific lectures; and educational videos.

**Speaking:** Small Talk; Mini presentations

**Reading:** Newspaper articles and Journal reports

**Writing:** Note-making / Note-taking; recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode)

**Language Focus:** Articles; Pronouns -Possessive & Relative pronouns;subject-verb agreement; collocations.

**[9]**

**Expression**

**Listening:** Debates/ discussions; different viewpoints on an issue; and panel discussions.

**Speaking:** Group discussions, debates & role plays.

**Reading:** Editorials; and opinion blogs.

**Writing:** Essay Writing (Descriptive or narrative).

**Language Focus:** Punctuation; Compound Nouns; simple, compound & complex sentences. cause & effect expressions.

**[9]**

| | Total Hours | 45 |
|---|---|---|
| **Text Book(s):** | | |
| 1. | *'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020 | |
| 2 | Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020 | |
| **Reference(s):** | | |

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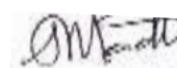
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| 1. | Paul Emmerson and Nick Hamilton, *'Five Minute Activities for Business English',* Cambridge University Press, New York, 2005 |
| 2. | Arthur Brookes and Peter Grundy,' *Beginning to Write: Writing Activities for Elementary and Intermediate Learners',* Cambridge University Press, New York, 2003 |
| 3. | Michael McCarthy and Felicity O Dell, *'English Vocabulary in Use: Upper Intermediate',* Cambridge University Press, N.York, 2012 |
| 4. | Lakshmi Narayanan, *'A Course Book on Technical English'* Scitech Publications (India) Pvt. Ltd. 2020 |

**Course Contents and Lecture Schedule**

| S.No | Topic | No. of Hours |
|---|---|---|
| 1 | **Introduction to Fundamentals of Communication** | |
| 1.1 | Listening for general information and Specific details | 1 |
| 1.2 | Self-introduction | 1 |
| 1.3 | Narrating personal experiences | 1 |
| 1.4 | Reading relevant to technical contexts and emails | 1 |
| 1.5 | Writing letters – informal | 1 |
| 1.6 | Writing letters - formal | 1 |
| 1.7 | Present Tenses | 1 |
| 1.8 | synonyms, antonyms and contranyms, and affixes | 1 |
| 1.9 | phrasal verbs; abbreviations & acronyms | 1 |
| 2 | **Narration and Summation** | |
| 2.1 | Listening to podcasts, documentaries and interviews with celebrities | 1 |
| 2.2 | Narrating personal experiences | 1 |
| 2.3 | Summarizing of documentaries | 1 |
| 2.4 | Reading travelogues, and excerpts from literature | 1 |
| 2.5 | Paragraph writing | 1 |
| 2.6 | Short report on an event (field trip etc.). | 1 |
| 2.7 | Past tenses | 1 |
| 2.8 | Prepositions | 1 |
| 2.9 | One-word substitution | 1 |
| 3 | **Description of a process / product** | |
| 3.1 | Listen to a product and process descriptions | 1 |
| 3.2 | Picture description | 1 |
| 3.3 | Giving instruction to use the product | 1 |
| 3.4 | Reading Advertisements, gadget reviews and user manuals | 1 |
| 3.5 | Writing Definitions and instructions | 1 |
| 3.6 | Future Tenses | 1 |
| 3.7 | Homonyms and Homophones | 1 |
| 3.8 | Imperatives | 1 |
| 3.9 | comparative adjectives, and discourse markers | 1 |
| 4 | **Classification and Recommendations** | |
| 4.1 | Listening to TED Talks and educational videos | 2 |

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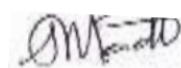
| 4.2 | Listening to scientific lectures | 1 |
|---|---|---|
| 4.3 | Small Talk and mini presentations | 2 |
| 4.4 | Reading newspaper articles and journal reports | 2 |
| 4.5 | Note-making / Note-taking | 1 |
| 4.6 | Recommendations | 1 |
| 4.7 | Transferring information from non-verbal | 1 |
| 4.8 | Articles and Pronouns | 2 |
| 4.9 | Subject-verb agreement and collocations | |
| **5** | **Expression** | |
| 5.1 | Listening to debates and panel discussions | 1 |
| 5.2 | Group discussions | 2 |
| 5.3 | Role plays | 1 |
| 5.4 | Reading editorials and opinion blogs | 1 |
| 5.5 | Essay Writing (Descriptive or narrative) | 1 |
| 5.6 | Punctuation and cause & effect expressions. | 1 |
| 5.7 | Compound Nouns | 1 |
| 5.8 | Simple, compound & complex sentences | 1 |
| | **Total** | **45** |

**Course Designers**

1. Dr.A.PALANIAPPAN  -palaniappan@ksrct.ac.in

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| 60 MA 001 | MATRICES AND CALCULUS | Category | L | T | P | Credit |
|-----------|----------------------|----------|---|---|---|--------|
| | | BS | 3 | 1 | 0 | 4 |

### Objective

- To familiarize the students with basic concepts in Cayley-Hamilton theorem and orthogonal transformation.
- To get exposed to the fundamentals of differential calculus in various methods.
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima.
- To solve various linear differential equations and method of variation of parameters.
- To learn various techniques and methods in solving definite and indefinite integrals.

### Prerequisite

NIL

### Course Outcomes

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

| CO1 | Apply Cayley-Hamilton theorem and reduce the quadratic form into canonical form. | Remember, Apply, Evaluate |
|-----|----------------------------------------------------------------------------------|---------------------------|
| CO2 | Apply differential calculus in solving various Engineering problems. | Remember, Understand, Apply |
| CO3 | Analyze Jacobian methods and constrained maxima and minima of the functions | Remember, Understand, Analyze |
| CO4 | Apply various methods in solving the differential equations | Remember, Apply |
| CO5 | Evaluate definite and indefinite integrals using different techniques. | Remember, Apply, Evaluate |

### Mapping with Programme Outcomes

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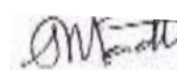
3- Strong; 2-Medium; 1-Some

### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests(Marks) | | Model Exam | End Sem Examination (Marks) |
|------------------|------|------|-----------|------------------------------|
| | 1 | 2 | | |
| Remember (Re) | 10 | 10 | 10 | 10 |
| Understand (Un) | 10 | 10 | 10 | 10 |
| Apply (Ap) | 30 | 20 | 40 | 40 |
| Analyze (An) | 0 | 20 | 20 | 20 |
| Evaluate (Ev) | 10 | 0 | 20 | 20 |
| Create (Cr) | 0 | 0 | 0 | 0 |

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| Total | 60 | 60 | 100 | 100 |
|-------|----|----|-----|-----|

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|---|
| **60 MA 001 - MATRICES AND CALCULUS** |
| **Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT, AI&DS, AI&ML** |

| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
|----------|---|---|---|-----------|--------|---------------|---|---|
| | L | T | P | | C | CA | ES | Total |
| I | 3 | 1 | 0 | 60 | 4 | 40 | 60 | 100 |

**Matrices**
Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties of Eigen values and Eigen vectors - Cayley-Hamilton theorem - Orthogonal transformation of a symmetric matrix to diagonal form - Reduction of quadratic form to canonical form by an Orthogonal transformation - Nature of quadratic form - Applications: Stretching of an elastic membrane. [9]

**Differentiation**
Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Successive Differentiation - Leibnitz's theorem - Applications: Maxima and Minima of functions of one variable. [9]

**Functions of Several Variables**
Partial differentiation - Homogeneous functions and Euler's theorem - Jacobians - Taylor's series for functions of two variables - Applications: Maxima and minima of functions of two variables - Constrained maxima and minima: Lagrange's Method of Undetermined Multipliers. [9]

**Differential Equations**
Linear differential equations of second and higher order with constant coefficients - R.H.S is of the form $e^{\alpha x}, \sin \alpha x, \cos \alpha x, x^n, n > 0$ - Differential equations with variable coefficients: Cauchy's and Legendre's form of linear equations - Method of variation of parameters. [9]

**Integration**
Definite and Indefinite integrals – Substitution rule - Techniques of Integration: Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass. [9]

| | **Total Hours:45+15(Tutorial)** | **60** |
|---|---|---|

**Text Book(s):**

| 1. | Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017. |
|----|---|
| 2 | Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019. |

**Reference(s):**

| 1. | Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016. |
|----|---|
| 2. | Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand & Company Ltd, New Delhi, 2017 |
| 3. | Bali N P and Manish Goyal," A text book of Engineering Mathematics",10th Edition, Laxmi Publications (P) Ltd, 2016. |
| 4. | "Matrix Analysis with Applications" Dr Gupta S K and Dr Sanjeev Kumar and Prof. Somnath Roy "Matrix Solvers", NPTEL Online Video Courses. |
| 5. | "Matrix Analysis with Applications" Dr Gupta S K and Dr Sanjeev Kumar and Prof. Somnath Roy "Matrix Solvers", NPTEL Online Video Courses. |

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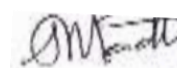Approved in Academic Council Meeting held on 23/12/23

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## Course Contents and Lecture Schedule

| S.No. | Topic | Number of Hours |
|---|---|---|
| **1** | **Matrices** | |
| 1.1 | Characteristic equation | 1 |
| 1.2 | Eigen values and Eigen vectors of a real matrix | 1 |
| 1.3 | Properties of Eigen values and Eigen vectors | 1 |
| 1.4 | Cayley-Hamilton theorem | 1 |
| 1.5 | Tutorial | 2 |
| 1.6 | Orthogonal transformation of a symmetric matrix to diagonal form | 1 |
| 1.7 | Reduction of quadratic form to canonical form by Orthogonal transformation | 1 |
| 1.8 | Nature of quadratic form | 1 |
| 1.9 | Stretching of an elastic membrane | 1 |
| 1.10 | Tutorial | 2 |
| **2** | **Differentiation** | |
| 2.1 | Representation of functions | 1 |
| 2.2 | Limit of a function and Continuity | 1 |
| 2.3 | Differentiation rules (sum, product, quotient, chain rules) | 2 |
| 2.4 | Successive differentiation | 1 |
| 2.5 | Tutorial | 2 |
| 2.6 | Leibnitz's theorem | 1 |
| 2.7 | Maxima and minima of functions of one variable | 2 |
| 2.8 | Tutorial | 2 |
| **3** | **Functions of Several Variables** | |
| 3.1 | Partial differentiation | 1 |
| 3.2 | Homogeneous functions and Euler's theorem | 1 |
| 3.3 | Jacobians | 2 |
| 3.4 | Tutorial | 2 |
| 3.5 | Taylor's series for functions of two variables | 1 |
| 3.6 | Maxima and minima of functions of two variables | 1 |
| 3.7 | Lagrange's Method of Undetermined Multipliers | 2 |
| 3.8 | Tutorial | 2 |
| **4** | **Differential Equations** | |
| 4.1 | Linear differential equations of second and higher order with constant co-efficient | 1 |
| 4.2 | R.H.S is of the form $e^{\alpha x}, \sin \alpha x, \cos \alpha x, x^n, n > 0$ | 2 |
| 4.3 | Tutorial | 2 |
| 4.4 | Differential equations with variable coefficients: Cauchy's form of linear equations | 2 |
| 4.5 | Differential equations with variable coefficients: Legendre's form of linear equations | 2 |
| 4.6 | Method of variation of parameters | 1 |

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| 4.7 | Tutorial | 2 |
|---|---|---|
| **5** | **Integration** | |
| 5.1 | Definite and Indefinite integrals | 1 |
| 5.2 | Substitution rule | 1 |
| 5.3 | Techniques of Integration: Integration by parts | 1 |
| 5.4 | Integration of rational functions by partial fraction | 1 |
| 5.5 | Tutorial | 2 |
| 5.6 | Integration of irrational functions | 1 |
| 5.7 | Improper integrals | 1 |
| 5.8 | Hydrostatic force. | 1 |
| 5.9 | Pressure, moments and centres of mass. | 1 |
| 5.10 | Tutorial | 2 |
| | **Total** | 60 |

### List of MATLAB Programs:

1. Introduction to MATLAB.
2. Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank.
3. Solution of system of linear equations.
4. Computation of Eigen values and Eigen vectors of a Matrix.
5. Finding ordinary and partial derivatives.
6. Solving first and second order ordinary differential equations.
7. Computing Maxima and Minima of a function of one variable.
8. Computing Maxima and Minima of a function of two variables.

## Course Designers
1. Dr.C.Chandran - cchandran@ksrct.ac.in
2. Mr. G.Mohan - mohan@ksrct.ac.in

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| 60 AD 001 | FOUNDATIONS OF ARTIFICIAL INTELLIGENCE | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 3 | 0 | 0 | 3 |

**Objective**

- To understand the role of data in AI
- To gain knowledge on Machine Learning process
- To investigate applications of Deep Learning
- To enhance the knowledge in RPA and NLP
- To understand the different use cases of robots in AI

**Prerequisite**

NIL

**Course Outcomes**

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

| CO1 | Demonstrate fundamental understanding of Artificial Intelligence, Data and its types | Understand |
|---|---|---|
| CO2 | Interpret the Machine Learning Process | Remember |
| CO3 | Analyse the concept of Deep Learning | Analyse |
| CO4 | Recognize the need of RPA in business process and analyse the process of NLP | Apply |
| CO5 | Enumeration the functionalities and roles of Robot in AI | Understand |

**Mapping with Programme Outcomes**

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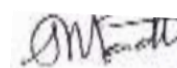
3- Strong;2-Medium;1-Some

**Assessment Pattern**

| Bloom'sCategory | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 30 | 0 | 20 |
| Understand (Un) | 30 | 0 | 50 |
| Apply (Ap) | 0 | 30 | 15 |
| Analyse (An) | 0 | 30 | 15 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AD 001 - Foundations of Artificial Intelligence** | | | | | | | | |
| **Common to AD and AM** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| I | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

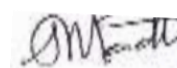| | |
|---|---|
| **AI Foundations and Data**<br>Turing Test, Cybernetics, Technological Drivers of Modern AI, Structure of AI, Data Basics, Types of Data, Database, Data Process, Data for AI, Ethics and Governance. | **[9]** |
| **Machine Learning**<br>Introduction, Machine Learning Process, Supervised Learning, Un Supervised Learning, Type of Machine Learning Algorithms. | **[9]** |
| **Deep Learning**<br>Introduction, Difference Between Deep Learning and Machine Learning, The Brain and Deep Learning, Back propagation, Deep Learning Applications. | **[9]** |
| **RPA and NLP**<br>Introduction to RPA, Implementing RPA, RPA and AI, Introduction to NLP, Challenges of NLP, Understanding Language Translation, Voice Recognition. | **[9]** |
| **Physical Robots**<br>Robot, Industrial and Commercial Robots, Robots in the Real World, Cybersecurity and Robots, Programming Robots for AI, Future of Robots. | **[9]** |
| **Total Hours** | **45** |

| | **Textbook(s):** |
|---|---|
| 1. | Tom Taulli, "Artificial Intelligence Basics A Non-Technical Introduction", Apress, 2019. |
| 2. | Peter Norvig and Stuart J. Russell, "Artificial Intelligence: A Modern Approach", Prentice Hall, 3rd Edition. |

| | **Reference(s):** |
|---|---|
| 1. | K. R. Chowdhary, "Fundamentals of Artificial Intelligence", Springer 2019 |
| 2. | David L. Poole, "Artificial Intelligence: Foundations of Computational Agents", 2nd edition, Cambridge University Press 2017. |
| 3. | Kevin Knight, Elaine Rich, B. Nair, "Artificial Intelligence", The McGraw-Hill, 3rd Edition. |
| 4. | M.C. Trivedi, "A classical approach to Artificial Intelligence", Khanna Book Publishing Company Private Limited. |

**Course Contents and Lecture Schedule**

| S. No. | Topic | No. of Hours |
|---|---|---|
| **1** | **AI Foundations and Data** | |
| 1.1 | Turing Test | 1 |
| 1.2 | Cybernetics | 1 |

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| 1.3 | Technological Drivers of Modern AI | 1 |
|---|---|---|
| 1.4 | Structure of AI | 1 |
| 1.5 | Data Basics | 1 |
| 1.6 | Types of Data | 1 |
| 1.7 | Database | 1 |
| 1.8 | Data Process, Data for AI | 1 |
| 1.9 | Ethics and Governance | 1 |
| **2** | **Machine Learning** | |
| 2.1 | Introduction | 1 |
| 2.2 | Machine Learning Process | 2 |
| 2.3 | Supervised Learning | 2 |
| 2.4 | Un Supervised Learning | 2 |
| 2.5 | Type of Machine Learning Algorithms | 2 |
| **3** | **Deep Learning** | |
| 3.1 | Introduction | 1 |
| 3.2 | Difference Between Deep Learning and Machine Learning | 2 |
| 3.3 | The Brain and Deep Learning | 2 |
| 3.4 | Back propagation | 2 |
| 3.5 | Deep Learning Applications | 2 |
| **4** | **RPA and NLP** | |
| 4.1 | Introduction to RPA | 1 |
| 4.2 | Implementing RPA | 2 |
| 4.3 | RPA and AI | 2 |
| 4.4 | Introduction to NLP | 2 |
| 4.5 | Challenges of NLP | 1 |
| 4.6 | Understanding Language Translation | 1 |
| 4.7 | Voice Recognition | |
| **5** | **Physical Robots** | |
| 5.1 | Robot | 1 |
| 5.2 | Industrial and Commercial Robots | 1 |
| 5.3 | Robots in the Real World | 2 |
| 5.4 | Cyber security and Robots | 2 |
| 5.5 | Programming Robots for AI | 2 |
| 5.6 | Future of Robots | 1 |
| | **Total** | **45** |

## Course Designers

1. Mr. N. GIRIDHARAN - giridharan@ksrct.ac.in

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| 60 ME 002 | ENGINEERING GRAPHICS | Category | L | T | P | Credit |
|-----------|----------------------|----------|---|---|---|--------|
|           |                      | ES | 2 | 0 | 4 | 4 |

### Objective

- To acquire various concepts of dimensioning, conventions and standards.
- To impart the graphic skills for converting pictorial views of solids in to orthographic views.
- To learn the concept in projection of solids, section of solids and development of different types of surfaces.
- To learn the concept of isometric projection.
- To learn the geometry and topology of engineered components

### Prerequisite

NIL

### Course Outcomes

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

| CO1 | Demonstrate the Impact of computer technologies on graphical communication. | Re/Un/Ap |
|-----|------------------------------------------------------------------------------|----------|
| CO2 | Convert the pictorial views in to orthographic views using drafting software. | Re/Un/Ap |
| CO3 | Draw the projection of simple solids, true shape of sections and development of surfaces. | Re/Un/Ap |
| CO4 | Construct the isometric projections of objects using drafting software. | Re/Un/Ap |
| CO5 | Interpret a design project illustrating engineering graphical skills. | Re/Un/Ap |

### Mapping with Programme Outcomes

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

3- Strong; 2-Medium; 1-Some
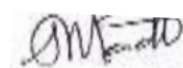
### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests(Marks) | | End Sem Examination(Marks) |
|------------------|-----|-----|-----|
|                  | 1 | 2 | |
| Remember | 10 | 10 | 20 |
| Understand | 20 | 20 | 30 |
| Apply | 30 | 30 | 50 |
| Analyse | 0 | 0 | 0 |
| Evaluate | 0 | 0 | 0 |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman
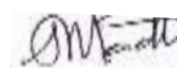
| Create | 0 | 0 | 0 |
|---|---|---|---|

| **K. S. Rangasamy College of Technology – Autonomous R2022** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 ME 002 – ENGINEERING GRAPHICS** | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| I | 2 | 0 | 4 | 90 | 4 | 50 | 50 | 100 |

**Introduction to Computer Aided Drafting (CAD) software**

Theory of CAD software – Menu System, Tool bars (Standard, Object Properties, Draw, Modify and Dimension) – Drawing Area (Background, Crosshairs, Coordinate System) – Dialog boxes and windows – Shortcut menus (Button Bars) – The Command Line and Status Bar – Different methods of zoom – Select and erase objects. [6+12]

**Orthographic Projection**

Theory of projection – Terminology and Methods of projection – first angle and third angle projection – Conversion of pictorial views into orthographic views [6+12]

**Projection of Solids and Sections of Solids**

Projections of simple solids: prism, pyramid, cylinder and cone (Axis parallel to one plane and perpendicular to other, axis inclined to one plane and parallel to other). Sections of simple solids: prism, pyramid, cylinder and cone in simple positions (cutting plane is inclined to one of the principal planes and perpendicular to the other) – True shape of sections [6+12]

**Development of Surfaces**

Principle of development-Methods of development: Parallel line development-Cube, Prism and Cylinder. Radial line development – Pyramid and cone [6+12]

**Isometric Projection**

Principles of Isometric projection – Isometric scale, Isometric views, Conventions – Isometric views of lines, Planes, Simple and compound Solids – Conversion of Orthographic views in to Isometric view [6+12]

**Application of Engineering Graphics**

Geometry and topology of engineered components: Creation of engineering models and their presentation in standard 2D blueprint form, 3D wire-frame and shaded solids – Geometric dimensioning and Tolerance – Use of solid modeling software for creating associative models – Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc. – Applying colour coding according to building drawing practice – Drawing sectional elevation showing foundation to ceiling – Introduction to Building Information Modelling (BIM). [6+12]

| | **Total Hours** | **90** |
|---|---|---|

**Text Book(s):**

1. Bhatt N.D., —Engineering Drawing, Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2019.

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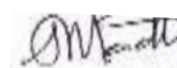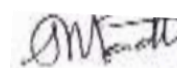| 2 | Venugopal K., —Engineering Graphics, New Age International (P) Limited, 2014. |
|---|---|
| **Reference(s):** | |
| 1. | Shah M.B., Rana B.C., and V.K.Jadon., —Engineering Drawing, Pearson Education, 2011. |
| 2. | Natarajan K.V., —A Text Book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2014. |
| 3. | Agrawal B. & Agrawal C. M., —Engineering Graphics, TMH Publication, 2012. |
| 4. | Narayana, K.L. & P Kannaiah, —Text book on Engineering Drawing, Scitech Publishers, 2008. |

## Course Contents and Lecture Schedule

| S.No | Topic | No. of Hours |
|---|---|---|
| **1** | **Introduction to Computer Aided Drafting (CAD) software** | |
| 1.1 | Theory of CAD software | 1 |
| 1.2 | Menu System, Tool bars (Standard, Object Properties, Draw, Modify and Dimension) | 2 |
| 1.3 | Drawing Area (Background, Crosshairs, Coordinate System) | 3 |
| 1.4 | Dialog boxes and windows – Shortcut menus | 3 |
| 1.5 | The Command Line and Status Bar | 1 |
| 1.6 | Different methods of zoom – Select and erase objects. | 2 |
| **2** | **Orthographic Projection** | |
| 2.1 | Introduction to orthographic projections | 2 |
| 2.2 | Planes of projection, | 2 |
| 2.3 | Projection of points | 1 |
| 2.4 | Projection of lines inclined to both planes. | 2 |
| 2.5 | Projection of planes | 2 |
| 2.6 | Projection of planes Inclined to both planes | 1 |
| 2.7 | Conversions of pictorial views to orthographic views. | 3 |
| 2.8 | Practice class for pictorial views to orthographic views. | 2 |
| 2.9 | Practice class for pictorial views to orthographic views. | 1 |
| **3** | **Projection of Solids** | |
| 3.1 | Projections of simple solids: prism | 2 |
| 3.2 | Projections of simple solids: cylinder | 3 |
| 3.3 | Projections of simple solids: pyramid | 2 |
| 3.4 | Projections of simple solids: Cone | 2 |
| 3.5 | Practice class for Projection of Solids | 2 |
| 3.6 | Axis of solid inclined to both HP and VP | 5 |

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| 3,7 | Section of solids for Prism, | 2 |
|---|---|---|
| 3,8 | Section of solids for Cylinder, | 2 |
| 3,9 | Section of solids for Pyramid, | 2 |
| 3,10 | Section of solids for Cone | 2 |
| 3,11 | Auxiliary Views - Draw the sectional orthographic views of geometrical solids. | 3 |
| 3.12 | Draw the sectional orthographic views of objects from industry. | 3 |
| 3,13 | Development of surfaces of Right solids Prism, | 2 |
| 3.14 | Development of surfaces of Right solids Pyramid | 2 |
| 3.15 | Development of surfaces of Right solids Cylinder and Cone | 2 |
| **4** | **Isometric Projection and Introduction to AutoCAD** | |
| 4.1 | Principles of isometric projection | 1 |
| 4.2 | Isometric scale | 2 |
| 4.3 | Isometric projections of simple solids: Prism, | 2 |
| 4.4 | Isometric projections of simple solids: Pyramid, | 2 |
| 4.5 | Isometric projections of simple solids: Cylinder | 1 |
| 4.6 | Isometric projections of simple solids: Cone | 2 |
| 4.7 | Isometric projections of frustum | 2 |
| 4.8 | Isometric projections of truncated solids | 2 |
| 4.9 | Combination of two solid objects in simple vertical positions. | 3 |
| 5 | \**Application of Engineering Graphics** | |
| 5.1 | Geometry and topology of engineered components: | 2 |
| 5.2 | Creation of engineering models and their presentation in standard 2D blueprint form, | 3 |
| 5.3 | 3D wire-frame and shaded solids – Geometric dimensioning and Tolerance – Use of solid modeling software for creating associative models | 3 |
| 5.4 | Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc. | 3 |
| 5.5 | Applying colour coding according to building drawing practice | 2 |
| 5.6 | Drawing sectional elevation showing foundation to ceiling | 2 |
| 5.7 | Introduction to Building Information Modelling (BIM). | 2 |

## Course Designers

1. Dr.K.Mohan- mohank@ksrct.ac.in

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| 60 CS 001 | C PROGRAMMING | Category | L | T | P | Credit |
|-----------|---------------|----------|---|---|---|--------|
|           |               | ES       | 3 | 0 | 0 | 3      |

## Objective

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements,
- To examine the concepts of arrays, its characteristics and types and strings.
- To understand the concept of functions, pointers and the techniques of putting them to use
- To apply the knowledge of structures and unions to solve basic problems in C language
- To enhance the knowledge in file handling functions for storage and retrieval of data

## Prerequisite

NIL

## Course Outcomes

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

| CO1 | Construct the fundamental building blocks of structured Programming in C | Apply |
|-----|-------------------------------------------------------------------------|-------|
| CO2 | Implement the different operations on arrays and strings | Apply |
| CO3 | Develop simple real world applications utilizing functions, recursion and pointers. | Apply |
| CO4 | Demonstrate the concepts of structures ,unions ,user defined data types and preprocessor | Apply |
| CO5 | Interpret the file concepts using proper standard library functions for a given application | Apply |

## Mapping with Programme Outcomes

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

3- Strong;2-Medium;1-Some
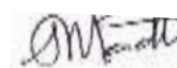
## Assessment Pattern

| Cognitive | Continuous Assessment Tests | End Semester |
|-----------|-----------------------------|--------------|
|           |                             |              |

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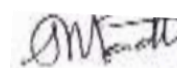
| Levels | 1 | 2 | Examination(Marks) |
|---|---|---|---|
| Remember | 10 | 10 | 20 |
| Understand | 10 | 10 | 20 |
| Apply | 40 | 40 | 60 |
| Analyse | - | - | - |
| Evaluate | - | - | - |
| Create | - | - | - |

## K. S. Rangasamy College of Technology – Autonomous R2022
### 60 CS 001 – C Programming
### Common to all Branches

| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| I | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Basics of C, I/O, Branching and Loops**<br>Structure of a C Program – Data types – Keywords - Variables – Type Qualifiers - Constants – Operators– expressions and precedence- Console I/O– Unformatted and Formatted Console I/O - Conditional Branching and Loops-Writing and evaluation of conditionals and consequent branching | [9] |
| **Arrays and Strings**<br>Arrays: One Dimensional Arrays - Two Dimensional Arrays – Matrix Manipulation - Character arrays – Strings: String Manipulation with and without String Handling Functions. | [7] |
| **Functions and Pointers**<br>Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Call by value and Call by reference – Function Categorization- Arguments to main function—Recursion and application - Passing Arrays to Functions– Storage class Specifiers.<br><br>Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Function and pointers - Dynamic memory allocation. | [11] |
| **Structures, Unions, Enumerations, Typedef and Preprocessors**<br>Structures - Introduction to Structures and Initialization - Arrays of Structures- Arrays and Structures, Nested Structures - Passing Structures to Functions - Structure Pointers - Unions – Bit Fields - Enumerations - typedef –The preprocessor and commands. | [9] |
| **File Handling**<br>File: Streams –Reading and Writing Characters - Reading and Writing Strings - File System functions – File Manipulation-Sequential access - Random Access Files – Command Line arguments. | [9] |
| **Total Hours** | **45** |

**Text Book(s):**

| 1. | Herbert Schildt, "The Complete Reference C", Fourth Edition, Tata McGraw Hill Edition, 2010. |
|---|---|
| 2. | Byron Gottfried, "Programming with C", Third Edition, McGraw Hill Education, 2014. |

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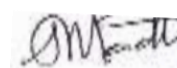| Reference(s): | |
|:---:|:---|
| 1. | E.Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016. |
| 2. | Brian W. Kernighan and Dennis M. Ritchie, "C Programming Language", Prentice-Hall. |
| 3. | ReemaThareja, "Computer Fundamentals and Programming in C", Second Edition, Oxford Higher Education, 2016 |
| 4. | K N King, "C Programming: A Modern Approach", Second Edition, W.W.Norton, New York, 2008. |

**Course Contents and Lecture Schedule**

| Module No. | Topic | No. of Hours |
|:---:|:---|:---:|
| **1** | **Basics of C, I/O, Branching and Loops** | |
| 1.1 | Structure of a C Program, Keywords | 1 |
| 1.2 | Data types, Type Qualifiers | 1 |
| 1.3 | Variables and Constants | 1 |
| 1.4 | Operators–expressions and precedence | 1 |
| 1.5 | Console I/O– Unformatted and Formatted Console I/O | 1 |
| 1.6 | Conditional Branching | 1 |
| 1.7 | Iteration and loops | 2 |
| 1.8 | Writing and evaluation of conditionals and consequent branching | 1 |
| **2** | **Arrays and Strings** | |
| 2.1 | One Dimensional Array | 1 |
| 2.2 | Two-Dimensional Array and Matrix Manipulation | 1 |
| 2.3 | Character arrays and Strings Basics | 1 |
| 2.4 | String Manipulation without String Handling Functions | 2 |
| 2.5 | String Manipulation with String Handling Functions | 2 |
| **3** | **Functions and Pointers** | |
| 3.1 | Scope of a Function – Library Functions, User defined functions and Function Prototypes | 1 |
| 3.2 | Function Call by value and Function Call by reference, Function Categorization | 2 |
| 3.3 | Arguments to main function | 1 |
| 3.4 | Recursion and application | 1 |
| 3.5 | Passing Arrays to Functions | 1 |
| 3.6 | Storage class Specifiers | 1 |
| 3.7 | Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions | 1 |
| 3.8 | Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers | 1 |
| 3.9 | Function and pointers | 1 |
| 3.10 | Dynamic memory allocation | 1 |
| **4** | **Structures, Unions, Enumerations, Typedef and Preprocessors** | |
| 4.1 | Introduction to Structures and Initialization | 1 |
| 4.2 | Arrays and Structures, Arrays of Structures | 1 |
| 4.3 | Structures within Structures, Passing Structures to Functions | 2 |

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| 4.4 | Structure Pointers | 1 |
|---|---|---|
| 4.5 | Unions and Bit Fields. | 1 |
| 4.6 | Enumerations - typedef | 1 |
| 4.7 | Preprocessor commands | 2 |
| **5** | **File Handling** | |
| 5.1 | File Streams –Reading and Writing Characters - Reading and Writing Strings | 2 |
| 5.2 | File System functions and File Manipulation | 2 |
| 5.3 | Sequential access | 2 |
| 5.4 | Random Access Files | 2 |
| 5.5 | Command Line arguments and  files | 1 |
| | **Total Hours** | **45** |

## Course Designers

1. Dr.P.KALADEVI   -   kaladevi@ksrct.ac.in

| 60 MY 001 | **ENVIRONMENTAL STUDIES AND CLIMATE CHANGE**<br>**(Common to all)** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | MC | 2 | 0 | 0 | 0 |

### Objective
- To understand the importance of ecosystem and biodiversity.
- To analyze the impacts of pollution, control and legislation.
- To enlighten awareness and recognize the social responsibility in environmental issues.
- To enlighten the waste management

### Prerequisite
NIL

### Course Outcomes

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

| CO1 | Understand the impacts of  pollution on  climate change | Understand |
|---|---|---|
| CO2 | Enhance the awareness the methods of waste management. | Apply |
| CO3 | Examine the value of sustainable future | Evaluate |
| CO4 | Evaluate the clean and green development for environmental problem | Evaluate |
| CO5 | Analyze the role of Geo-science in environmental management | Analyze |

### Mapping with Programme Outcomes
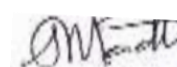
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 1 | 3 | 2 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 |
| CO4 | 2 | 2 | 3 | 3 | - | 1 | 3 | 3 | 2 | 2 | 1 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | |

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**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests | | | End Sem Examination(Marks) |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| Remember | 10 | 10 | 10 | - |
| Understand | 20 | 20 | 20 | |
| Apply | 30 | 30 | 30 | |
| Analyze | 30 | 30 | 30 | - |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

**Model Titles for Case Study**
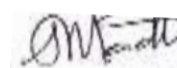
1. Environmental impacts of quarry industries in MelurTaluk.
2. A study on impacts of tanneries on ground water and soil quality in Bhavani, Erode district.
3. Effect of pharmaceutical industry on groundwater quality in oikaraipatty village, AlagarKovil.
4. Solid waste and waste water management in KSR hostel.
5. Environmental effect of Kudankulam atomic power plant.
6. Case study on effect of Sterlite industry
7. Effect of textile wastes in Tiruppur and Karur District.
8. Segregation of waste and its recycling by Pallipalayam Municipality at Nammakal
9. Effect of fire work waste on atmosphere in Sivakasi region.
10. Effect of noise pollution waste on atmosphere in Sivakasi region.

**K.S.Rangasamy College of Technology – Autonomous R2022**
**60 MY 001 - Environmental Studies and Climate Change**
**Common to all**

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| I | 2 | 0 | 0 | 20 | 0 | 100 | - | 100 |

**Pollution and its impact on climate change**

Pollution: Sources and impacts of air pollution – greenhouse effect- global warming- climate change - ozone layer depletion - acid rain. Carbon Footprint - Climate change on various sectors – Agriculture, forestry and ecosystem – climate change mitigation and adaptation. Action plan on climate change. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes. **[4]**
*Activity*: Study of carbon emission nearby place or industry.

**Integrated Waste Management**

Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan – Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste - risk management: Collection, segregation, treatment and disposal methods. Waste water treatment- ASP **[4]**
*Activity*: Analysis and design of waste management systems, prepare a model / project -wealth from waste

**Sustainable development practices**

Sustainable development goals (SDGs) – Green computing- Carbon trading - Green building – Eco- friendly plastic – Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – **[4]**

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| | |
|---|---|
| Hydroelectric power. Water scarcity- Watershed management, ground water recharge and rainwater harvesting.<br> *Activity*: Select a topic and analyze the value of sustainable development. | |
| **Environment and Agriculture:** Organic farming – bio-pesticides- composting, bio composting, vermi-composting, roof gardening and irrigation. Waste land reclamation. Climate resilient agriculture. Green auditing<br> *Activity*: Prepare a green auditing report on energy, water etc. | **[4]** |
| **Geo-science in natural resource management**<br> Data base software in environment information, Digital image processing applications in forecasting. GPS, Remote Sensing and Geographical Information System (GIS), World wide web (www), Environmental information system (ENVIS).<br>*Activity*: Prepare the report using IT tool. | **[4]** |
| **Total Hours** | **20** |

**Textbook(s):**

| | |
|---|---|
| 1. | Anubha Kaushik , C P Kaushik. Perspectives In Environmental Studies, New Age International publishers; Sixth edition (1 January 2018) |

**Reference(s):**

| | |
|---|---|
| 1. | G.Tyler Miller Environmental Science 14th Edition Cengage Publications, Delhi, 2013 |
| 2. | Gilbert M.Masters and Wendell P. Ela,"Environmental Engineering And Science", Phi Learning Private Limited, 3rd Edition,2015 |
| 3. | Erach Bharucha. Textbook of Environmental Studies for Undergraduate Courses, Universities Press, 2000 |

| **Course Contents and Lecture Schedule** | | |
|---|---|---|
| **Module.No** | **Topic** | **No. of hours** |
| 1.0 | **Pollution and its impact on climate change** | |
| 1.1 | Pollution: Sources and impacts of air pollution – greenhouse effect- Global warming- climate change - ozone layer depletion - acid rain | 2 |
| 1.2 | Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation | 1 |
| 1.3 | Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes | 1 |
| 2.0 | **Integrated Waste Management** | |
| 2.1 | Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan | 1 |
| 2.2 | Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste | 1 |
| 2.3 | Risk management: Collection, segregation, treatment and disposal methods. | 1 |
| 2.4 | Waste water treatment- ASP | 1 |
| 3.0 | **Sustainable development practices** | |
| 3.1 | Sustainable development goals (SDGs) – Green computing- Carbon trading - Green building – Eco- friendly plastic | 1 |

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| | | |
|---|---|---|
| 3.2 | Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power | 2 |
| 3.3 | Water scarcity- Watershed management, ground water recharge and rainwater harvesting | 1 |
| 4.0 | **Environment and Agriculture** | |
| 4.1 | Organic farming – bio-pesticides | 1 |
| 4.2 | Composting, bio composting, vermi-composting | 1 |
| 4.3 | Roof gardening and irrigation | 1 |
| 4.4 | Waste land reclamation. Climate resilient agriculture, Green auditing | 1 |
| 5.0 | **Geo-science in natural resource management** | |
| 5.1 | Data base software in environment information, Digital image processing applications in forecasting | 2 |
| 5.2 | GPS, Remote Sensing and Geographical Information System (GIS) | 1 |
| 5.3 | World wide web (www), Environmental information system (ENVIS) | 1 |
| | Total | 20 |

## Course Designers

Course Designers
1.Dr.T.A.SUKANTHA – sukantha@ksrct.ac.in
2.Dr.K.PRABHA – prabhak@ksrct.ac.in
3.Dr.S.MEENACHI – meenachi@ksrct.ac.in

| | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **60 CS 0P1** | **C PROGRAMMING LABORATORY** | ES | 0 | 0 | 4 | 2 |

## Objective

- To enable the students to apply the concepts of C to solve simple problems
- To use selection and iterative statements in C programs
- To apply the knowledge of library functions in C programming
- To implement the concepts of arrays, functions, structures and pointers in C
- To implement the file handling operations through C

## Prerequisite

NIL

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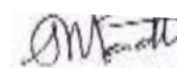
On the successful completion of the course, students will be able to

| CO1 | Read, display basic information and use selection and iterative statements. | Apply |
|---|---|---|
| CO2 | Demonstrate C program to manage collection of related data. | Apply |
| CO3 | Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts. | Apply |

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| | | | |
|---|---|---|---|
| CO4 | Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives. | Apply |
| CO5 | Demonstrate C program to store and retrieve data using file concepts. | Apply |

## Mapping with Programme Outcomes

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

## List of Experiments
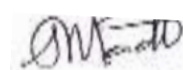
1. Implementation of Simple computational problems using various formulas*.

2. Implementation of Problems involving Selection statements*.

3. Implementation of Iterative problems e.g., sum of series*.

4. Implementation of 1D Array manipulation*.

5. Implementation of 2D Array manipulation*.

6. Implementation of String operations*.

7. Implementation of Simple functions and different ways of passing arguments to functions and Recursive Functions*.

8. Implementation of Pointers*

9. Implementation of structures and Union*.

10. Implementation of Bit Fields, Typedef and Enumeration*.

11. Implementation of Preprocessor directives*.

12. Implementation of File operations*.

 * **SDG:4- Quality Education**

BoS Chairman

**Course Designers**

    1. Dr.P.Kaladevi        - kaladevi@ksrct.ac.in

| 60 ME 0P1 | Fabrication and Reverse Engineering Laboratory | Category | L | T | P | Credit |
|-----------|-----------------------------------------------|----------|---|---|---|--------|
|           |                                               | ES       | 0 | 0 | 4 | 2      |

**Objective**

- To acquire skills in operating tools and instruments
- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding
- To provide hands-on training on household wiring and electronic circuits
- To offer real time activity on plumbing connections in domestic applications
- To provide hands-on activities on dismantling, and assembling the Home Appliance, Center lathe operations, computer's internal components and peripherals

**Prerequisite**

NIL

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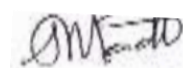
On the successful completion of the course, students will be able to

| CO1 | Perform power tools operations | Apply |
|-----|-------------------------------|-------|
| CO2 | Make a wooden model using carpentry process | Apply |
| CO3 | Make a model using sheet metal, filing and joining a MS plate | Apply |

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| | | | |
|---|---|---|---|
| CO4 | Repair and Maintenances of water lines for home applications | Apply |
| CO5 | Trouble shoots the electrical and electronic circuits, Electrical Machines and realizes the reputation of house wiring, home Appliance, computer internal components and peripherals | Apply |

**Mapping with Programme Outcomes**

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

**Syllabus**

**Performs of Power Tools**
Drilling in different Walls and Materials Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with clamps.

**Carpentry Process**
Design and Development of Wooden Model using the Carpentry Process T / Cross Joint / different joints

**Sheet Metal and Filling Process**
Design and Development of Metal Model - Make a Tray Components using Sheet Metal Process and Mating of Square joint in MS Plate using the Filling Process

**Welding Process**
Fabrication of Models with MS Plate using Arc Welding- Lap Joint, Butt Joint, T Joint
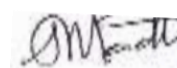
**Plumbing Process**
Repair and Maintenances of Pipe Fitting for Home Applications Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, cutting of threads in G.I. Pipes by thread cutting dies.

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**Residential house wiring**
Design and Excusion of Residential house wiring With and Without UPS- 1 BHK - 2 BHK.  Design and fabrication of domestic LED lamps - Circuit designing (calculation of components)

**Electronic Circuit wiring**
PCB fabrication – Soldering - Assembling of Audio Amplifiers- Connecting USB/Bluetooth MP3 player board - Connecting Volume controllers - Connecting bass & treble filter boards - Connecting Surround and sub-woofer filter board

**Assembling and dismantling of Electronics Machines**
Iron box, Induction stove, Water heater, Mixer, Table fan, Ceiling fan

**Study Exercises**
Demonstration of Centre Lathe operations Facing, Turning, and drilling and its components.
Assemble and dismantle of Vacuum Cleaner / Refrigerator and its components

**Computer Hardware Study Exercises**
Identify internal components of computer - Assemble and dismantle desktop computer systems

**List of Experiments**

### 1. Fitting of Wall mounting Parts using Power Tools

a) Drilling in different Walls and Materials

b) Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with Clamps.

### 2. Making of Wooden model using the Carpentry Process

a) T / Cross Joint

b) Mortise and Tenon Joint / different joints

### 3. Making of Metal Model

a) Making of Components using Sheet Metal Process

b) Mating of Components using the Filling Process

### 4. Fabrication of Welded model

### 5. Repair and Maintenance of Pipe Fitting for Home Applications

a) Assembly of GI pipes/PVC and Pipe Fitting

b) Cutting of Threads in GI pipes by thread Cutting Dies
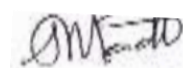
### 6. Assembling and dismantling of

a) Iron box

b) Induction stove

c) Water heater

d) Mixer

e) Table fan

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f) Ceiling fan

**7. Design and Execution of Residential house wiring**

　　a) 1 BHK

　　b) 2 BHK

**8. Design and Execution of Residential house wiring with UPS.**

　　a) 1 BHK

　　b) 2 BHK

**9. Design and fabrication of domestic LED lamps**

　　a) Circuit designing (calculation of components)

　　b) PCB fabrication

　　c) Soldering

**10. Assembling of Audio Amplifiers**

　　a) Connecting USB/Bluetooth MP3 player board

　　b) Connecting Volume controllers

　　c) Connecting bass & treble filter boards

　　d) Connecting Surround and sub-woofer filter board

**Study Exercises**

　　1. Demonstration of Centre Lathe and its operations like Facing, Turning, and drilling.

　　2. Dismantle and Assemble of Vacuum Cleaner / Refrigerator.

　　3. Study of components of computer. Dismantle and assemble of desktop computer systems

## Course Designers

1. Mr.S Sakthivel - sakthivel_s@ksrct.ac.in
2. Dr. D Sri Vidya -  srividhya@ksrct.ac.in
3. Mr. K. Raguvaran – raguvaran@ksrct.ac.in

| 60 EN 002 | **PROFESSIONAL ENGLISH - II** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | HS | 1 | 0 | 2 | 2 |
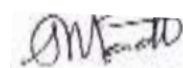
## Objective

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts

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- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

**Prerequisite**

Basic knowledge of reading and writing in English and should have completed Professional English I.

**Course Outcomes**

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

| CO1 | Compare and contrast products and ideas in technical texts. | Analyze |
|-----|-------------------------------------------------------------|---------|
| CO2 | Identify cause and effects in events, industrial processes through technical texts | Analyze |
| CO3 | Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format. | Analyze |
| CO4 | Report events and the processes of technical and industrial nature. | Apply |
| CO5 | Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search. | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO2 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 | 2 | 3 |
| CO3 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 | 2 | 3 |
| CO4 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO5 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 | 3 | 3 |

3- Strong;2-Medium;1-Some

**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination(Marks) |
|------------------|:----:|:----:|:----:|
|                  | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Apply (Ap) | 20 | 20 | 40 |
| Analyse (An) | 30 | 30 | 50 |
| Create (Cr) | 0 | 0 | 0 |

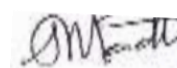| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 EN 002 - Professional English II** | | | | | | | | |
| **Common to All Branches** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|          | L | T | P |        | C | CA | ES | Total |
| II | 1 | 0 | 2 | 30 | 2 | 40 | 60 | 100 |

**Making Comparisons** [9]

**Listening:** Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison)

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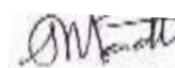Approved in Academic Council Meeting held on 23/12/23

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| | |
|---|---|
| **Speaking:** Marketing a product, persuasive speech techniques.<br>**Reading:** Reading advertisements, user manuals and brochures.<br>**Writing:** Professional emails, Email etiquette - compare and contrast essay.<br>**Language Focus:** mixed tenses, prepositional phrases, same words used in different contexts and discourse markers | |
| **Expressing Causal Relations in Speaking and Writing**<br>**Listening:** Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects.<br>**Speaking:** Describing and discussing the reasons of accidents or disasters based on news reports.<br>**Reading:** longer technical texts– cause and effect essays, and letters / emails of complaint,<br>**Writing:** Writing responses to complaints<br>**Language Focus:** Active Passive Voice transformations, Infinitive and Gerunds – Word Formation (Noun-Verb-Adj-Adv), Adverbs. | **[9]** |
| **Problem Solving**<br>**Listening:** Listening to / watching movie scenes/ documentaries depicting a technical problem and suggesting solutions.<br>**Speaking:** Group Discussion (based on case studies), - techniques and Strategies.<br>**Reading:** Case Studies, excerpts from literary texts, news reports etc.<br>**Writing:** Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay<br>**Language Focus:** Error correction; If conditional sentences - Compound Words, Sentence Completion. | **[9]** |
| **Reporting of Events and Research**<br>**Listening:** Listening Comprehension based on new report and documentaries –<br>**Speaking:** Interviewing, presenting oral reports, Mini presentations on select topics.<br>**Reading:** Newspaper articles.<br>**Writing:** Recommendations, Transcoding, Accident Report, Precis writing and Summarising, and Plagiarism<br>**Language Focus:** Reported Speech – Modals - Conjunctions- use of Prepositions | **[9]** |
| **The Ability to put Ideas or Information Coherently**<br>**Listening:** Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance).<br>**Speaking:** Participating in role plays, virtual interviews, making presentations with visual aids<br>**Reading:** excerpts of interview with professionals<br>**Writing:** Job / Internship application – Cover letter & Résumé<br>**Language Focus:** Numerical Adjectives, question types: Wh/ Yes or No/ and Tags; Relative Clauses - Idioms. | **[9]** |
| **Total Hours** | **45** |

| | |
|---|---|
| **Text book(s):** | |
| 1. | *'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020 |
| 2. | Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020 |
| **Reference(s):** | |
| 1. | Raman. Meenakshi, Sharma. Sangeeta, *'Professional English'*. Oxford university press. New Delhi. 2019 |
| 2. | Arthur Brookes and Peter Grundy,' *Beginning to Write: Writing Activities for Elementary and Intermediate Learners',* Cambridge University Press, New York, 2003 |

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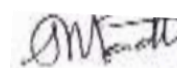| 3. | Prof. R.C. Sharma & Krishna Mohan, *'Business Correspondence and Report Writing'*, Tata McGraw Hill & Co. Ltd., New Delhi, 2001 |
| 4. | V.N. Arora and Laxmi Chandra, *'Improve Your Writing'*, Oxford University Press, New Delhi, 2001 |

**Course Contents and Lecture Schedule**

| S.No | Topic | No. of Hours |
|---|---|---|
| **1** | **Making Comparisons** | |
| 1.1 | Evaluative Listening | 1 |
| 1.2 | Product Descriptions and filling a graphic organiser | 1 |
| 1.3 | Marketing a product by using persuasive techniques | 2 |
| 1.4 | Reading advertisements, user manuals and brochures | 1 |
| 1.5 | Writing professional emails | 1 |
| 1.6 | Compare and contrast essay | 1 |
| 1.7 | mixed tenses and prepositional phrases | 1 |
| 1.8 | Same words used in different contexts | 1 |
| **2** | **Expressing Causal Relations in Speaking and Writing** | |
| 2.1 | Listening to longer technical talks | 1 |
| 2.2 | Listening to process/event descriptions | 1 |
| 2.3 | Describing and discussing the reasons of accidents or disasters | 1 |
| 2.4 | Reading longer technical texts– cause and effect essays | 1 |
| 2.5 | Writing responses to complaints | 1 |
| 2.6 | Active Passive Voice transformations | 2 |
| 2.7 | Infinitive and Gerunds | 1 |
| 2.8 | Word Formation (Noun-Verb-Adj-Adv), Adverbs. | 1 |
| 3 | **Problem Solving** | |
| 3.1 | Listening to documentaries and suggesting solutions | 1 |
| 3.2 | Group Discussion (based on case studies) | 2 |
| 3.3 | Reading Case Studies, excerpts from literary texts and news reports | 1 |
| 3.4 | Letter to the Editor | 1 |
| 3.5 | Checklists | 1 |
| 3.6 | Problem solution and argumentative essays | 1 |
| 3.7 | Error correction and Sentence Completion | 1 |
| 3.8 | If conditional sentences | 1 |
| **4** | **Reporting of Events and Research** | |
| 4.1 | Listening Comprehension | 1 |
| 4.2 | Interviewing and presenting oral reports | 1 |
| 4.3 | Mini presentations on select topics | 1 |
| 4.4 | Reading newspaper articles | 1 |

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| 4.5 | Recommendations | 1 |
|---|---|---|
| 4.6 | Transcoding | 1 |
| 4.7 | Precis writing and Summarising | 1 |
| 4.8 | Reported Speech, Modals | 1 |
| 4.9 | Conjunctions | |
| 5 | **The Ability to put Ideas or Information Coherently** | |
| 5.1 | Listening to Formal job interviews | 1 |
| 5.2 | Role plays | 2 |
| 5.3 | Virtual interviews | 1 |
| 5.4 | Reading Company profiles | 1 |
| 5.5 | Writing Statement of Purpose (SoPs) | 1 |
| 5.6 | Writing Résumé | 1 |
| 5.7 | Numerical Adjectives and Relative Clauses - Idioms | 1 |
| 5.8 | question types: Wh/ Yes or No/ and Tags | 1 |
| | **Total** | **45** |

## Course Designers

1. Dr.A.PALANIAPPAN          - palaniappan@ksrct.ac.in

| **60 MA 006** | **LINEAR ALGEBRA AND DISCRETE MATHEMATICS** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 3 | 1 | 0 | 4 |

### Objective

- To gain basic knowledge about linear algebra.
- To facilitate different techniques in solving system of vectors.
- To perform different operations associated with sets, functions, and relations.
- To get exposed to basics of Mathematical logic.
- To familiarizethe machine intelligence problems based on principle of counting.

### Prerequisite
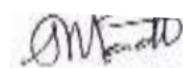
NIL

### CourseOutcomes

Onthesuccessful completion ofthecourse,students will beable to

| CO1 | Understand the linear algebra concepts in approximations and matrix decompositions. | Remember, Understand, Apply |
|-----|-----|-----|
| CO2 | Apply the concepts of basis and dimension in vector spaces. | Remember, Understand, Apply |
| CO3 | Analyze the concepts of relations, functions, and operations on sets. | Remember, Analyze |
| CO4 | Employ logic principles to evaluate the reliability of a programme. | Apply, Understand Analyze |
| CO5 | Use the counting principles in implementing various programmes. | Knowledge Understand |

**MappingwithProgrammeOutcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 3 | 3 | 3 | 2 | | | | | | 1 | 2 | 3 | 2 | |
| CO2 | 3 | 3 | 3 | 3 | 2 | | | | | | 1 | 2 | 3 | 2 | |
| CO3 | 3 | 3 | 2 | 2 | 1 | | | | | | 2 | 2 | 2 | 2 | |
| CO4 | 3 | 3 | 2 | 3 | 2 | | | | | | 2 | 2 | 2 | 3 | |
| CO5 | 3 | 3 | 2 | 3 | 2 | | | | | | 2 | 2 | 2 | 3 | |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | | |
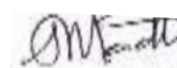
**AssessmentPattern**

| Bloom'sCategory | ContinuousAssessmentTests (Marks) | | Model Exam (Marks) | End Sem Examination (Marks) |
|-----|-----|-----|-----|-----|
| | 1 | 2 | | |
| Remember (Re) | 10 | 10 | 10 | 10 |
| Understand (Un) | 10 | 10 | 20 | 20 |
| Apply (Ap) | 40 | 40 | 50 | 50 |
| Analyze (An) | 0 | 0 | 20 | 20 |
| Evaluate (Ev) | 0 | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 | 0 |
| Total | 60 | 60 | 100 | 100 |

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| K.S.Rangasamy College ofTechnology–AutonomousR2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60 MA 006 – Linear Algebra and Discrete Mathematics | | | | | | | | |
| Artificial Intelligence and Machine Learning | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| II | 3 | 1 | 0 | 60 | 4 | 40 | 60 | 100 |

| | |
|---|---|
| **Linear Algebra**<br>Linear Equations in Linear Algebra: **System of Linear Equations**\*– Row reduction and Echelon forms– Vector equations – Matrix Equation Ax = b – Linear independence– **Introduction to linear transformation**\*–**Matrix of a linear transformation**\*\*– Geometric linear transformations of $R^2$ –Transformation from $R^n$ to $R^m$ –Linear models in network flow. | **[9]** |
| **Vector Spaces**\*\*<br>Vector spaces - Subspaces – Null spaces – Row and column spaces – Linear independent sets, basis and dimension of vector spaces – Rank – Change of basis – Applications to difference equations and Markov chains. | **[9]** |
| **Set Theory \*, \*\***<br>Sets – Set Operations – Relations and Their Properties– Representing Relations– Equivalence relations –Functions. | **[9]** |
| **Mathematical Logic \*, \*\***<br>Propositional logic – Propositional equivalences – Predicates and quantifiers – Rules of inference. | **[9]** |
| **Combinatorics \*, \*\***<br>Permutations and Combinations - Pigeonhole Principle-Mathematical induction – Recurrence relations–Generating functions. | **[9]** |
| **Total Hours: 45 + 15(Tutorial)** | **60** |

**Textbook(s):**

| 1. | DavidC.Lay, Steven R. Lay, Judith McDonald"Linear Algebra and its Applications", 6th Edition, Harlow: Pearson Education Ltd.2022. |
|---|---|
| 2. | J. P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 49th Reprint, McGraw–Hill Education Private Limited, New Delhi, 2016. |

**Reference(s):**

| 1. | GilbertStrang, Introduction to linearalgebra,5th Edition, ANEBooks,2016. |
|---|---|
| 2. | K. H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Publishing Company Ltd.,New Delhi, 2011. |
| 3. | T. Veerarajan," Discrete Mathematics with Graph Theory and combinatorics", 5th Reprint, Tata McGrawHill Publishing Company Ltd., 2008. |
| 4. | C. L. Liu, "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017. |
| 5. | Prof. Sudarshan Iyengar, Prof. Neeldhara, "Discrete Mathematics" – NPTEL online video course. |

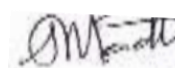**\*SDG:4 Quality Education,**
**\*\*SDG:9 Industry, Innovation, Infrastructure, Promote inclusive and sustainable industrialization.**

**CourseContentsandLectureSchedule**

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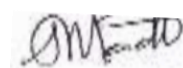
BoS Chairman

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Linear Algebra** | |
| 1.1 | Linear Equations in Linear Algebra: System of Linear Equations | 1 |
| 1.2 | Row reduction and Echelon forms | 1 |
| 1.3 | Vector equations – Matrix Equation Ax = b | 1 |
| 1.4 | Linear independence | 1 |
| 1.5 | Tutorial | 2 |
| 1.6 | Introduction to linear transformation | 1 |
| 1.7 | Matrix of a linear transformation | 1 |
| 1.8 | Geometric linear transformations of $R^2$ – Transformation from $R^n$ to $R^m$ | 1 |
| 1.9 | Linear models in network flow | 1 |
| 1.10 | Tutorial | 2 |
| **2** | **Vector Spaces** | |
| 2.1 | Vector spaces and subspaces | 1 |
| 2.2 | Null spaces | 1 |
| 2.3 | Row and column spaces | 1 |
| 2.4 | Linear independent sets of vector spaces | 1 |
| 2.5 | basis and dimension of vector spaces | 1 |
| 2.6 | Tutorial | 2 |
| 2.7 | Rank | 1 |
| 2.8 | Change of basis | 1 |
| 2.9 | Applications to difference equations and Markov chains | 1 |
| 2.10 | Tutorial | 2 |
| **3** | **Set Theory** | |
| 3.1 | Sets | 1 |
| 3.2 | Set Operations | 1 |
| 3.3 | Relations and Their Properties | 1 |
| 3.4 | Representing Relations | 1 |
| 3.5 | Tutorial | 2 |
| 3.6 | Equivalence relations | 2 |
| 3.7 | Functions | 2 |
| 3.8 | Tutorial | 2 |
| **4** | **Mathematical Logic** | |
| 4.1 | Propositional logic | 2 |
| 4.2 | Propositional equivalences | 2 |
| 4.3 | Tutorial | 2 |
| 4.4 | Predicates and quantifiers | 2 |
| 4.5 | Rules of inference | 2 |
| 4.6 | Tutorial | 2 |

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| 5 | **Combinatorics** | |
|---|---|---|
| 5.1 | Permutations | 1 |
| 5.2 | Combinations | 1 |
| 5.3 | Pigeonhole Principle | 1 |
| 5.4 | Tutorial | 2 |
| 5.5 | Mathematical induction | 1 |
| 5.6 | Recurrence relations | 2 |
| 5.7 | Generating functions | 2 |
| 5.8 | Tutorial | 2 |
| | **Total** | **60** |

## CourseDesigners

2. **Dr.D.TAMIZHARASAN** -tamizharasan@ksrct.ac.in
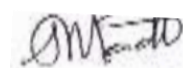
List of MATLAB Programmes:

1. Introduction to linear algebra with MATLAB.

2. Calculate the reduced row echelon form.

3. Find the basis of null space, column space, row space associated with a matrix.

4. Various functions for set operations, like union, intersection etc.
5. Functions for logical operations.

6. Find the permutation and combination of the values.

| 60 PH 004 | **PHYSICS FOR COMPUTER TECHNOLOGY**<br><br>**(B.E/B.Tech. CSE, IT, AI&DS & AI&ML)** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 3 | 0 | 0 | 3 |

**Objectives**
1. To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
2. To enable the students to correlate the theoretical principles with application oriented studies in optoelectronic materials
3. To introduce the basics of laser, optical fiber and its applications in information science
4. To understand the basic concepts of magnetic materials and its applications
5. To inculcate an idea of significance of nano structures, ensuing nano device applications and quantum computing

**Prerequisite**
Nil
**Course Outcomes**
On the successful completion of the course, students will be able to

| CO1 | Acquire knowledge on basics of semiconductor physics and its applications in various devices | Understand |
|---|---|---|
| CO2 | Apply the principles of LCD, photo detectors and optoelectronic devices for various engineeringapplications | Apply |
| CO3 | Assess a strong foundational knowledge in lasers and fiber optics. | Understand |
| CO4 | Impart knowledge on magnetic properties of materials and their applications in data storage. | Apply & Analyse |
| CO5 | Recognize the basics of quantum structures and their applications and basics of quantum computing | Understand |

**Mapping with Programme Outcomes**

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | - | - | 3 | 3 | - | 2 | - | 2 | - | 2 | - |
| CO2 | 3 | 3 | 2 | 2 | - | - | 3 | 3 | - | 2 | - | 2 | - | 2 | - |
| CO3 | 3 | 3 | 2 | 2 | - | - | 3 | 3 | - | 2 | - | 2 | - | 2 | - |
| CO4 | 3 | 3 | 2 | 2 | - | - | 3 | 3 | - | 2 | - | 2 | - | 2 | - |
| CO5 | 3 | 3 | 2 | 2 | - | - | 3 | 3 | - | 2 | - | 2 | 2 | 2 | - |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | | |
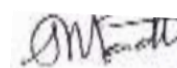
**Assessment Pattern**

| Bloom'sCategory | Continuous Assessment Tests(Marks) | | End Sem Examination(Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember | 10 | 10 | 30 |
| Understand | 20 | 20 | 30 |
| Apply | 30 | 30 | 30 |

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| | | | |
|---|---|---|---|
| Analyse | 0 | 0 | 10 |
| Evaluate | 0 | 0 | 0 |
| Create | 0 | 0 | 0 |

* **SDG:4- Quality Education**
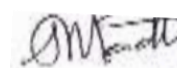
**Course Contents and Lecture Schedule**

| S. No. | Topic | No. of hours |
|---|---|---|
| 1.0 | **SEMICONDUCTING MATERIALS** | |
| 1.1 | Intrinsic Semiconductors | 1 |
| 1.2 | Energy band diagram - direct and indirect band gap semiconductors | 1 |
| 1.3 | Carrier concentration inintrinsic semiconductors | 1 |
| 1.4 | extrinsic semiconductors | 1 |
| 1.5 | Carrier concentration in N-type & P-type semiconductors | 1 |
| 1.6 | Carrier transport in Semiconductor: random motion | 1 |
| 1.7 | Carrier transport in Semiconductor drift, mobility and diffusion | 1 |
| 1.8 | Hall effect and devices | |
| 1.9 | Ohmic contacts –Schottky diode | |
| 2.0 | **OPTOELECTRONIC MATERIALS AND DEVICES** | |
| 2.1 | Photoconductive materials. | 1 |
| 2.2 | Light Dependent Resistor – Working of LDR – Applications of LDR | 1 |
| 2.3 | Photovoltaic materials | 1 |
| 2.4 | Solar cell – Construction and working of a solar cell | 1 |
| 2.5 | Applications of solar cells | 1 |
| 2.6 | Liquid crystals – Liquid crystal Display (LCD) | 1 |
| 2.7 | Construction and advantages of LCD | 1 |
| 2.8 | Electro optic materials – Optoelectric effect | 1 |
| 2.9 | Electro-Optic Modulation | 1 |
| 3.0 | **PHOTONICS** | |
| 3.1 | Theory of laser - characteristics | 1 |
| 3.2 | Einstein's coefficients - population inversion | 1 |
| 3.3 | Nd-YAG laser, semiconductor laser | 1 |
| 3.4 | Applications of Lasers: Micro machining, measurement of long distances | 1 |
| 3.5 | Applications of Lasers IR Thermography, CD write devices and printers | 1 |
| 3.6 | Optical fibre- principle | 1 |
| 3.7 | Types - material, mode, refractive index - Fibre loss | 1 |
| 3.8 | Expression for acceptance angle and numerical aperture | 1 |
| 3.9 | Application – Fiber Optic Communication | 1 |

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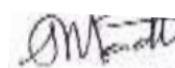Approved in Academic Council Meeting held on 23/12/23

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| K.S.Rangasamy College of Technology – Autonomous R 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 PH 004 - Physics for Computer Technology** | | | | | | | |
| Semester | Hours / Week | | | Total Hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| II | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **SEMICONDUCTING MATERIALS***<br>Intrinsic Semiconductors - Energy band diagram - direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts –Schottky diode. | [09] |
| **OPTOELECTRONIC MATERIALS AND DEVICES***<br>Photoconductive materials – Light Dependent Resistor – Working of LDR – Applications of LDR – Photovoltaic materials – Solar cell – Construction and working of a solar cell – Applications of solar cells – Liquid crystals – Liquid crystal Display (LCD) – Construction and advantages of LCD – Electro optic materials – Optoelectric effect - Electro-Optic Modulation. | [09] |
| **PHOTONICS***<br>Theory of laser - characteristics - Einstein's coefficients - population inversion - Nd-YAG laser, semiconductor laser - Applications of Lasers: Micro machining, measurement of long distances, IR Thermography, CD write devices and printers - Optical fibre- principle - types - material, mode, refractive index - Fibre loss - Expression for acceptance angle and numerical aperture. Application – Fiber Optic Communication. | [09] |
| **MAGNETIC MATERIALS AND DEVICES***<br>Origin of magnetic moment - Bohr magneton - Classification of magnetic materials - diamagnetism - paramagnetism - ferromagnetism - anti ferromagnetism - ferri magnetism - Domain theory - Hysteresis - soft and hard magnetic materials - examples and uses - Magnetic principle in computer data storage - Magnetic hard disc (Giant Magneto Resistance sensor). | [09] |
| **NANOTECHNOLOGY AND QUANTUM COMPUTING***<br>Introduction - Preparation of Nano materials: Top-down process: Ball Milling method - Bottom-up process: Vapour Phase Deposition method. Carbon Nano Tubes - structures, properties and preparation by electric arc method. MEMS/NEMS Devices and Applications- Quantum system for information processing - quantum states - classical bits - quantum bits - multiple qubits - quantum gates. | [09] |
| **Total Hours: 45** | |

**Text Book(s):**

| | |
|---|---|
| 1 | N. Avadhanulu, P. G. Kshirsagar, TVS Arun Murthy "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022. |
| 2 | H. K. Malik, A. K. Singh "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. |
| 3 | D. R. Joshi "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2010 |

**Reference(s):**

| | |
|---|---|
| 1 | D. Pillai "A Textbook Of Engineering Physics"  New Age International (P) Limited,  New Delhi, 2014B. R. Puri, L.R. Sharma, and S. P. Madan. Principles of Physical Chemistry: Vishal Publishing Company. Gumber Market, Old Railway Road, Jalandhar. |
| 2 | B. B. Laud " Lasers and Non-Linear Optics" New Age International Publications, New Delhi, 2015B.S. Bahl, G.D. Tuli, Arun Bahl. Essentials of Physical Chemistry. S.Chand and Company, Ltd. New Delhi. |
| 3 | Palanisamy, P.K., "Physics of Materials", Scitech Publications, Chennai. 2012 |

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| 4.0 | **MAGNETIC MATERIALS AND DEVICES** | |
|---|---|---|
| 4.1 | Origin of magnetic moment | 1 |
| 4.2 | Bohr magneton - Classification of  magneticmaterials | 1 |
| 4.3 | Diamagnetism - paramagnetism - | 1 |
| 4.4 | Ferromagnetism - anti ferromagnetism | 1 |
| 4.5 | Ferri magnetism - Domain theory | 1 |
| 4.6 | Domain theory - Hysteresis | 1 |
| 4.7 | Soft and hard magnetic materials - examples and uses | 1 |
| 4.8 | Magnetic principle in computer data storage | 1 |
| 4.9 | Magnetic hard disc (Giant Magneto Resistance sensor). | 1 |
| 5.0 | **NANOTECHNOLOGY AND QUANTUM COMPUTING** | |
| 5.1 | Introduction | 1 |
| 5.2 | Preparation of Nano materials | 1 |
| 5.3 | Top-down process: Ball Milling method | 1 |
| 5.4 | Bottom-up process: Vapour Phase Deposition method | 1 |
| 5.5 | Carbon Nano Tubes - structures, properties | 1 |
| 5.6 | Preparation by electric arc method | 1 |
| 5.7 | MEMS/NEMS Devices and Applications | 1 |
| 5.8 | Quantum system for information processing | 1 |
| 5.9 | Quantum states - classical bits - quantum bits - multiple qubits - quantum gates | 1 |

**Course Designers**
1. Dr. V. Vasudevan
2. Mr.S. Vanchinathan
3. Dr. P. Suthanthira Kumar

| 60 CH 004 | **ENGINEERING CHEMISTRY**<br>**(Common to CSE, IT & AIML)** | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| | | | BS | 3 | 0 | 0 | 3 |

**Objective**
  The objective of this course is to bestow a better understanding of basic concepts of chemistry and its applications. It imparts the knowledge on the concepts of electrochemistry and its applications. This course also highlights application of chemical sensors in software engineering. It also helps to understand the industrial importance of smart materials and the concept of cheminformatics.
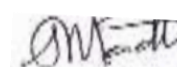
**Prerequisite**
Nil

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

| CO1 | Identify the types of hardness of water and its removal. | Understand  Apply & Analyse |
|---|---|---|

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| | | |
|---|---|---|
| CO2 | Understand the concept of electrochemistry and its applications | Understand |
| CO3 | Interpret the principles of sensors in various applications | Apply |
| CO4 | Recognize the types of smart materials. | understand |
| CO5 | Interpret the structures by cheminformatics. | Understand & Apply |

## Mapping with Programme Outcomes

* SDG 6: Improve Clean Water and Sanitation
** SDG 9 Industry, innovation and infrastructure

| CO | PO | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO1 | 2 | | 2 | | 2 | | 2 | | | | | 2 | | 2 |
| CO2 | 2 | 2 | 2 | | 2 | | | | | | | | 2 | |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | | | | | 3 | 3 | 3 |
| CO4 | 3 | 2 | 2 | 3 | | 2 | | | | | | 3 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | | | | | 3 | 3 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests | | | Terminal Examination |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| Remember | 20 | 20 | 20 | 20 |
| Understand | 40 | 40 | 40 | 40 |
| Apply | 40 | 40 | 40 | 40 |
| Analyze | - | - | - | - |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |
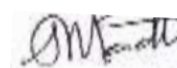
## Syllabus

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 CH 004 ENGINEERING CHEMISTRY** | | | | | | | | |
| Sem ester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| I | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**WATER TECHNOLOGY***

Introduction – Commercial and industrial uses of water - hardness - types – estimation of hardness by EDTA method- Internal conditioning (colloidal, phosphate, calgon and carbonate conditioning methods) – external conditioning (Zeolite process, demineralization process) - Desalination methods (Reverse Osmosis and Electro dialysis). Flash evaporation. — 7 hrs

**ELECTROCHEMISTRY ***  — 9 hrs

Electrode potential - Nernst Equation - derivation and problems - reversible and irreversible cells - Types of Electrodes and its applications - reference electrodes - pH, conductometric and Potentiometric titrations - Principles of electro plating and electro less plating- fabrication process of Printed Circuit Board.

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| | | |
|---|---|---|
| **CHEMICAL SENSORS**** Sensors – Chemical Sensors – Characteristics – Elements and Characterization - Potentiometric Sensors -  Amperometric Sensors – Sensors Based on Electrochemical Methods – Electrochemical Biosensors – Optical Biosensors : Enzyme Sensors – Bio affinity Sensors -  DNA Sensors. Chemical Sensors as Detectors and Indicators: Indicators for Titration Processes – Separation Methods. Nano technology in chemical sensors. | | 10 hrs |
| **SMART MATERIALS**** Liquid crystal polymers - Organic Light Emitting Diode (OLED) - [polythiopene] - working and applications – Conductive polymers and Semi conducting polymers: principle and applications-organic: Organic dielectric material [Polystyrene, PMMA]. Smart screen materials: Inorganic Rare earth metals [yttrium, lanthanum, cerium] - Conductive components: Indium tin oxide [properties and applications] - touch screen [resistive and capacitive] - magnetic storage [Iron oxide, cobalt alloy] – optical storage [photo chromic materials] - solid storage. | | 9 hrs |
| **CHEMINFORMATICS**** Definition – coordinate –bonds –bond length – bond angles – torsional angles – chemical structure – definition - conformation – representation of structural information – linear format – SMILEYF notation – MOL format – PDB format – storage of structural data in a database - structural keys – finger print -canonical structure using chemdraw – similarity search –sub structure search - application of chem-informatics in drugs designing. | | 10 hrs |
| | **Total Hours** | **45** |

**Text Book(s):**

1.  O.G. Palanna "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2017.

**Reference(s):**

1.Jain. P.C. and Monica Jain, "Engineering Chemistry", Dhanpatrai publishing co. New Delhi, 14th edition, 2015.

2. Peter Grundler "Chemical Sensors" ISBN 978-3-540-45742-8 Springer Berlin Heidelberg New York, 2007

3.O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

4.Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2nd Edition, 2019.
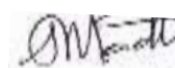
## Course Contents and Lecture Schedule

| S. No. | Topic | No. of hours |
|---|---|---|
| 1.0 | **Water Technology** | |
| 1.1 | Introduction – Commercial and Industrial uses of water | 1 |
| 1.2 | Hardness - types | 1 |
| 1.3 | Estimation of Hardness of ater by EDTA method | 1 |
| 1.4 | Internal conditioning (Colloidal, Phosphate, Calgon and Carbonate) | 1 |
| 1.5 | External conditioning (Zoelite process & Demineralization process) | 1 |
| 1.6 | Desalination methods (Reverse Osmosis and Electrodialysis) | 1 |
| 1.7 | Flash Evaporation | 1 |
| 2.0 | **ELECTROCHEMISTRY** | |

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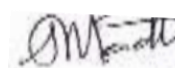| 2.1 | Electrode potential - Nernst Equation - derivation and problems | 2 |
|-----|---------------------------------------------------------------|---|
| 2.2 | Reversible and irreversible cells | 1 |
| 2.3 | Types of Electrodes and its applications | 1 |
| 2.4 | Reference electrodes  - pH | 1 |
| 2.5 | Conductometric and Potentiometric titrations | 1 |
| 2.6 | Principles of electro plating and electro less plating- | 2 |
| 2.7 | Fabrication process of Printed Circuit Board. | 1 |
| 3.0 | **CHEMICAL SENSORS** | |
| 3.1 | Sensors – Chemical Sensors - Characteristics | 1 |
| 3.2 | Elements and Characterization | 1 |
| 3.3 | Potentiometric Sensors, Amperometric Sensors | 1 |
| 3.4 | Sensors Based on Electrochemical Methods | 1 |
| 3.5 | Electrochemical Biosensors | 1 |
| 3.6 | Optical Biosensors :  Enzyme Sensors – Bio affinity Sensors | 1 |
| 3.7 | DNA Sensors. Chemical Sensors as Detectors and Indicators | 1 |
| 3.8 |  Indicators for Titration Processes | 1 |
| 3.9 | Separation Methods. Nano technology in chemical sensors. | 2 |
| 4.0 | **SMART MATERIALS** | |
| 4.1 | Liquid crystal polymers - Organic Light Emitting Diode (OLED) - [polythiopene] - working and applications | 2 |
| 4.2 | Conductive polymers and Semi conducting polymers: principle and applications | 2 |
| 4.3 | Organic: Organic dielectric material [Polystyrene, PMMA]. | 1 |
| 4.4 | Smart screen materials: Inorganic Rare earth metals [yttrium, lanthanum, cerium] | 2 |
| 4.5 | Conductive components: Indium tin oxide [properties and applications] - touch screen [resistive and capacitive] | 1 |
| 4.6 | Magnetic storage [Iron oxide, cobalt alloy] | 1 |
| 4.7 | Optical storage [photo chromic materials] - solid storage. | 1 |
| 5.0 | **CHEMINFORMATICS** | |
| 5.1 | Definition – coordinate –bonds –bond length – bond angles – torsional angles – chemical structure – | 2 |
| 5.2 | Definition - conformation – representation of structural information | 2 |
| 5.3 | Linear format – SMILEYF notation – MOL format – PDB format – | 1 |
| 5.4 | Storage of structural data in a database - structural keys | 2 |
| 5.5 | Finger print -canonical structure using chemdraw | 1 |
| 5.6 | Similarity search –sub structure search - | 1 |
| 5.7 | Application of chem-informatics in drugs designing | 1 |

**Course Designers**

1. Dr.T.A.SUKANTHA
2. Dr.B.SRIVIDHYA
3. Dr.K.PRABHA
4. Dr.S.MEENACHI

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5. Mr.K.TAMILARASU
6. Ms.D.KIRTHIGA

| 60 EE 001 | Basic Electrical and Electronics Engineering | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | ES | 3 | 0 | 0 | 3 |

### Objective

- To familiarize the basic concept on electrical circuits and its various parameters
- To facilitate the various types of electrical machines and their uses
- To gain knowledge on Electrical safety
- To provide exposure on the functions of various semiconductor devices
- To familiarize the use of various measuring instruments

### Prerequisite
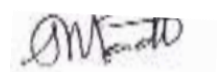
NIL

### Course Outcomes

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

| | | |
|------|------|------|
| CO1 | Apply the basic laws of electric circuits to calculate the unknown quantities. | Remember, Understand and Apply |
| CO2 | Acquire knowledge on different electrical machines and select suitable machines for industrial applications. | Remember, Understand and Analyze |
| CO3 | Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety. | Remember, Understand |
| CO4 | Realize the operation and characteristics of semiconductor devices. | Remember, Understand and Analyze |
| CO5 | Understand the operating principles of measuring instruments and choose suitable instrument for measuring the parameters. | Remember, Understand |

## Mapping with Programme Outcomes

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

## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------|------|------|------|
| | 1 | 2 | |
| Remember | 10 | 20 | 30 |
| Understand | 20 | 25 | 30 |
| Apply | 20 | 10 | 30 |
| Analyse | 10 | 5 | 10 |
| Evaluate | 0 | 0 | 0 |
| Create | 0 | 0 | 0 |

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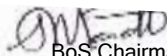
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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 EE 001 – Basic Electrical and Electronics Engineering** |
| **Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches** |
| | Semester | | Hours / Week | | Total hrs | Credit | | Maximum Marks |
| L | T | P | C | CA | ES | Total |
| I | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**ELECTRICAL CIRCUITS**

DC Circuits: Circuit Components: Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems.
Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform real power, reactive power and apparent power, power factor – Steady state analysis of RLC series circuits- Simple problems. Introduction to three phase AC circuits **[10]**

**ELECTRICAL MACHINES**

Construction and Working principle - Separately and Self excited DC Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor. **[10]**

**ELECTRICAL INSTALLATIONS**

Domestic wiring, types of wires and cables, earthing, protective devices - switch fuse unit - Miniature Circuit Breaker - Moulded Case Circuit Breaker - Earth Leakage Circuit Breaker, Batteries and types, UPS, Safety precautions and First Aid. **[9]**

**ANALOG ELECTRONICS**

Introduction to Semiconductor Materials – PN Junction Diodes, Zener Diode – Characteristics and Applications – Bipolar Junction Transistor - Biasing and Configuration (NPN) - Regulated power supply unit, switched mode power supply. **[8]**

**MEASUREMENTS AND INSTRUMENTATION**

Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Operating principles and Types of Wattmeter, Energy Meter, Instrument Transformers - CT and PT, DSO - Block diagram - Data acquisition**.** **[8]**

| | |
|---|---|
| **Total Hours** | 45 |

**Text Book(s):**

| | |
|---|---|
| 1. | Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020. |
| 2. | A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015. |

**Reference(s):**

| | |
|---|---|
| 1. | Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019. |
| 2. | Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017. |
| 3. | Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002. |
| 4. | H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010 |

**Course Contents and Lecture Schedule**

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| S.No | Topic | No. of Hours |
|------|-------|--------------|
| **1** | **ELECTRICAL CIRCUITS** | |
| 1.1 | Circuit Components: Resistor, Inductor, Capacitor | 1 |
| 1.2 | Ohm's Law - Kirchhoff's Laws | 1 |
| 1.3 | Ohm's Law - Kirchhoff's Laws - Problems | 2 |
| 1.4 | Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform | 2 |
| 1.5 | Real power, reactive power and apparent power, power factor | 1 |
| 1.6 | Steady state analysis of RLC series circuits | 1 |
| 1.7 | RLC series circuits - Problems | 1 |
| 1.8 | Introduction to three phase system | 1 |
| **2** | **ELECTRICAL MACHINES** | |
| 2.1 | Construction and Working principle of DC Generator | 1 |
| 2.2 | Types and Applications of Separately and Self excited DC Generators | 1 |
| 2.3 | EMF equation of DC Generator | 1 |
| 2.4 | Working Principle of DC motors | 1 |
| 2.5 | Torque Equation | 1 |
| 2.6 | Types and Applications | 1 |
| 2.7 | Construction, Working principle and Applications of Transformer | 1 |
| 2.8 | Construction, Working principle and Applications of Three phase Alternator | 1 |
| 2.9 | Construction, Working principle and Applications of Synchronous motor | 1 |
| 2.10 | Construction, Working principle and Applications of Three Phase Induction Motor | 1 |
| **3** | **ELECTRICAL INSTALLATIONS** | |
| 3.1 | Domestic wiring, types of wires and cables | 1 |
| 3.2 | Earthing, protective devices | 2 |
| 3.3 | Switch fuse unit - Miniature Circuit Breaker | 1 |
| 3.4 | Molded Case Circuit Breaker - Earth Leakage Circuit Breaker | 1 |
| 3.5 | Batteries and types | 2 |
| 3.6 | UPS | 1 |
| 3.7 | Safety precautions and First Aid | 1 |
| **4** | **ANALOG ELECTRONICS** | |
| 4.1 | Introduction to Semiconductor Materials | 1 |
| 4.2 | Characteristics and Applications of PN Junction Diodes | 1 |
| 4.3 | Characteristics and Applications of Zener Diode | 1 |
| 4.4 | Bipolar Junction Transistor | 1 |

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| 4.5 | Biasing & Configuration (NPN) | 2 |
|-----|-------------------------------|---|
| 4.6 | Regulated power supply unit | 1 |
| 4.7 | Switched mode power supply | 1 |
| **5** | **MEASUREMENTS AND INSTRUMENTATION** | |
| 5.1 | Functional elements of an instrument | 1 |
| 5.2 | Standards and calibration | 1 |
| 5.3 | Moving Coil meters - Operating Principle, types | 1 |
| 5.4 | Moving Iron meters - Operating Principle, types | 1 |
| 5.5 | Operating principles and Types of Wattmeter | 1 |
| 5.6 | Energy Meter | 1 |
| 5.7 | Instrument Transformers – CT & PT | 1 |
| 5.9 | DSO - Block diagram - Data acquisition | 1 |
| | **Total** | **45** |

## Course Designers

1. Mr.S.Srinivasan     - srinivasan@ksrct.ac.in
2. Ms.R.Radhamani     - radhamani@ksrct.ac.in
3. Ms.S.Jaividhya       - jaividhya@ksrct.ac.in
4. Dr.S.Gomathi        - gomathi@ksrct.ac.in
5. Mr.T.Prabhu         - prabhut@ksrct.ac.in

| 60 IT 001 | PYTHON PROGRAMMING | Category | L | T | P | Credit |
|-----------|--------------------|----------|---|---|---|--------|
| | | PC | 3 | 1 | 0 | 4 |

## Objective

- To know the basics of programming in Python
- To understand modules and functions
- To study files and exception handling
- To recognize the basic concepts of NumPy
- To create layouts using graphical tools

## Prerequisite

Basic Knowledge of mathematics and programming

## Course Outcomes

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

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| | | | |
|---|---|---|---|
| CO1 | Apply the basics of Python Programming for problem-solving | | Apply |
| CO2 | Develop programs using modules and functions | | Apply |
| CO3 | Implement programs using file and exception handling | | Apply |
| CO4 | Create a solution for real world problems using NumPy arrays | | Apply |
| CO5 | Design layouts with GUI toolkits using Tkinter | | Apply |

## Mapping with Programme Outcomes

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO2 | 3 | 2 | 3 | 2 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO3 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO4 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO5 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

## Assessment Pattern

| Cognitive Levels | Continuous Assessment Tests | | End Semester Examination(Marks) |
|---|---|---|---|
| | **1** | **2** | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 20 | 10 | 20 |
| Apply (Ap) | 30 | 30 | 60 |
| Analyse (An) | 00 | 00 | 00 |
| Evaluate (Ev) | 00 | 00 | 00 |
| Create (Cr) | 00 | 10 | 10 |

| K. S. Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 IT 001 – Python Programming** | | | | | | | | |
| **Common to CS, IT, AD** | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | E | Total |
| II | 3 | 1 | 0 | 60 | 4 | 40 | 60 | 100 |
| **Introduction**<br>Introduction to Python – Strings – List – Tuples - Dictionaries – Basic Operators – Decision Making – Loops | | | | | | | | [9] |
| **Modular Design**<br>Modules – Python module – Namespaces – Importing modules – Loading and Execution – Program Routine – Functions – Parameter Passing - Types – Recursion | | | | | | | | [9] |

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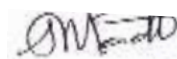BoS Chairman

| | | |
|---|---|---|
| **Files and Exception Handling**<br>Introduction - Data Streams - Creating own data Streams - Access Modes - Writing Data to a File – Reading Data From a File - Additional File Methods- Exceptions – Types, Handling Exceptions, User Defined Exceptions | | [9] |
| **NumPy Basics**<br>NumPy Data Types – NumPy Arrays - Creating, Adding items, Removing items, Printing Items, Sorting items, Reshaping, Indexing and Slicing | | [10] |
| **GUI Programming and Graphics**<br>GUI Programming toolkits – Introduction to Tkinter – Creating GUI widgets – Resizing – Configuring<br>widget options – Creating Layouts – Radio buttons – Check boxes – Dialog boxes – Drawing using Turtle | | [8] |
| **Total Hours:45+15(Tutorial)** | | 60 |

**Text Book(s):**

| | |
|---|---|
| 1. | John Paul Mueller, "Beginning Programming with Python", 2nd Edition, Wiley India Pvt Ltd, 2014 |
| 2. | Usman Malik, "Python NumPy for Beginners: NumPy Specialization for data Scientists", AI Publishing, 2021 |

**Reference(s):**

| | |
|---|---|
| 1. | Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2013 |
| 2. | Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016. |
| 3. | Charles Dierbach, "Introduction to Computer Science using Python", 2nd Edition, Wiley India Pvt Ltd, 2015 |
| 4. | Dr. R.Nageswara Rao "Core Python Programming", DreamTech Press, 2nd Edition, 2018 |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | Introduction to Python | 1 |
| 1.2 | Basic Data Types | 1 |

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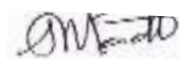Approved in Academic Council Meeting held on 23/12/23

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| 1.3 | Strings | 1 |
|---|---|---|
| 1.4 | List | 1 |
| 1.5 | Tuples | 1 |
| 1.6 | Dictionaries | 1 |
| 1.7 | Basic Operators | 1 |
| 1.8 | Decision Making Statements | 1 |
| 1.9 | Looping Statements | 1 |
| **2** | **Modular Design** | |
| 2.1 | Modules | 1 |
| 2.2 | Python module | 1 |
| 2.3 | Namespaces | 1 |
| 2.4 | Importing modules | 1 |
| 2.5 | Loading and Execution | 1 |
| 2.6 | Program Routine | 1 |
| 2.7 | Functions | 1 |
| 2.8 | Parameter Passing Types | 1 |
| 2.9 | Recursion | 1 |
| **3** | **Files and Exception Handling** | |
| 3.1 | Introduction | 1 |
| 3.2 | Data Streams | 1 |
| 3.3 | Creating own data Streams | 1 |
| 3.4 | Access Modes | 1 |
| 3.5 | Writing Data to a File, Reading Data From a File | 1 |
| 3.6 | Additional File Methods | 1 |
| 3.7 | Exceptions and Types | 1 |
| 3.8 | Handling Exceptions | 1 |
| 3.9 | User Defined Exceptions | 1 |
| **4** | **NumPy Basics** | |
| 4.1 | NumPy Data Types | 1 |
| 4.2 | NumPy Arrays | 1 |
| 4.3 | Creating Arrays | 1 |
| 4.4 | Adding items into Arrays | 1 |
| 4.5 | Removing items | 1 |
| 4.6 | Printing Items | 1 |
| 4.7 | Sorting items | 1 |
| 4.8 | Reshaping | 1 |
| 4.9 | Indexing and Slicing | 1 |
| **5** | **GUI Programming and Graphics** | |
| 5.1 | GUI Programming toolkits | 1 |
| 5.2 | Introduction to Tkinter | 1 |
| 5.3 | Creating GUI widgets | 1 |

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| 5.4 | Resizing | 1 |
|-----|----------|---|
| 5.5 | Configuring Widget options | 1 |
| 5.6 | Creating Layouts | 1 |
| 5.7 | Radio buttons & Check boxes | 1 |
| 5.8 | Dialog boxes | 1 |
| 5.9 | Drawing using Turtle | 1 |
| | **Total** | **45** |

## Course Designers

1. Dr.C,Nallusamy  - nallusamyc@ksrct.ac.in
2. Mr.R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

| **60 GE 001** | **Heritage of Tamils**<br>(Common to all Branches ) | Category | L | T | P | Credit |
|---------------|--------|----------|---|---|---|--------|
| | | GE | 1 | 0 | 0 | 1 |

## Objectives:

- To learn the extensive literature of classical Tamil.
- To review the fine arts heritage of Tamil culture.
- To realize the contribution of Tamils in Indian freedom struggle.
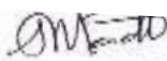
## Prerequisite:

Nil

## Course Outcomes:

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

| CO1 | Recognize the extensive literature of Tamil and its classical nature. | Understand |
|-----|----------------------------------------------------------------------|------------|
| CO2 | Apprehend the heritage of sculpture, painting and musical instruments of ancient people. | Understand |
| CO3 | Review on folk and martial arts of Tamil people. | Understand |
| CO4 | Insight thinai concepts, trade and victory of Chozha dynasty. | Understand |
| CO5 | Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine. | Understand |

## Mapping with Programme Outcomes

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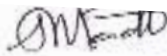
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| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO2 | | | | | | | 3 | 3 | | 2 | | 3 |
|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

**Syllabus**

| K. S. Rangasamy College of Technology – Autonomous R2022 |||||||||
|---|---|---|---|---|---|---|---|---|

### 60 GE 001 - Heritage of Tamils

| Semester | Hours/Week ||| Total hrs | Credit | Maximum Marks ||| 
|---|---|---|---|---|---|---|---|---|
| | L | T | P | Total hrs | C | CA | ES | Total |
| II | 1 | 0 | 0 | 15 | 1 | 100 | - | 100 |

**Language and Literature**
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan. — 3

**Heritage - Rock Art Paintings to Modern Art – Sculpture**
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils. — 3

**Folk and Martial Arts**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils. — 3

**Thinai Concept of Tamils**
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas. — 3

**Contribution of Tamils to Indian National Movement and Indian Culture**
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books. — 3

| | **Total Hours** | **15** |
|---|---|---|

**Text Book(s):**

| 1. | தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை ( வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). |
|---|---|
| 2. | கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). |
| 3. | கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 4. | பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு). |

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| 5. | Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print). |
| 6. | Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. |
| 7. | Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). |
| 8. | The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) |
| 9. | Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu) |
| 10. | Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author). |
| 11. | Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu). |
| 12. | Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book. |

| 60 GE 001 | தமிழர் மரபு<br>(அனைத்து துறைகளுக்கும் பொதுவானது) | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | GE | 1 | 0 | 0 | 1 |

**பாடத்தின் நோக்கங்கள்:**

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்.

**முன்கூட்டிய துறைசார் அறிவு:**

தேவை இல்லை

**பாடம் கற்றதின் விளைவுகள்:**

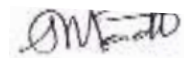பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

| CO1 | தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல். | புரிதல் |
|---|---|---|
| CO2 | தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு. | புரிதல் |
| CO3 | தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு. | புரிதல் |
| CO4 | தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள். | புரிதல் |
| CO5 | இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல். | புரிதல் |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO2 | | | | | | | 3 | 3 | | 2 | | 3 |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

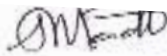| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO3 | | | | | | | 3 | 3 | | 2 | 3 |
| CO4 | | | | | | | 3 | 3 | | 2 | 3 |
| CO5 | | | | | | | 3 | 3 | | 2 | 3 |

3- Strong; 2-Medium; 1-Low

**Syllabus**

**K. S. Rangasamy College of Technology – Autonomous R2022**

**60 GE 001 - தமிழர் மரபு**

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | Total |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | |
| II | 1 | 0 | 0 | 15 | 1 | 100 | - | 100 |

| | |
|---|---|
| **மொழி மற்றும் இலக்கியம்:**<br>இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் -சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள் - தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. | 3 |
| **மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை–சிற்பக் கலை:**<br>நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு. | 3 |
| **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:**<br>தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள். | 3 |
| **தமிழர்களின் திணைக் கோட்பாடுகள்:**<br>தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி. | 3 |
| **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:**<br>இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு. | 3 |
| **Total Hours** | **15** |

**Text Book(s):**

| 1. | தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை ( வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). |
|---|---|
| 2. | கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). |
| 3. | கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 4. | பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 5. | Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print). |
| 6. | Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. |
| 7. | Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). |

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| 8. | The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) |
|---|---|
| 9. | Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) |
| 10. | Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author). |
| 11. | Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu). |
| 12. | Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book. |

| 60 CP 0P2 | ENGINEERING PHYSICS AND CHEMISTRY LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 0 | 0 | 4 | 2 |

## Objective

- To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- To analyze the behavior and characteristics of various materials for its optimum utilization
- Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
- To facilitate data interpretation and expose the learners to various industrial and environmental applications

## Prerequisite

NIL

## Course Outcomes

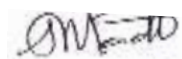On the successful completion of the course, students will be able to

| CO1 | Analyze the properties of semiconducting materials for its potential applications | Analyze |
|---|---|---|
| CO2 | Realize the interference and diffraction phenomena by Airwedge and laser experiments | Apply |
| CO3 | Recognize the magnetic properties by experimental verification | Apply |
| CO4 | Apply different techniques of qualitative and quantitative chemical analysis to generate experimental skills and apply these skills to various analyses | Apply |
| CO5 | Explain and analyze instrumental techniques for chemical analysis | Analyze |

## MappingwithProgrammeOutcomes (CSE, IT, AIML, EEE, ECE, VLSI)

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | 3 | - | - | - | 3 | 3 | 2 | 2 | 2 | - | 2 |

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| | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 3 | 3 | - | 3 | - | - | - | 3 | 3 | 2 | 2 | 2 | - | - |
| CO3 | 3 | 3 | - | 3 | - | - | - | 3 | 3 | 2 | 2 | 2 | - | 2 |
| CO4 | 3 | 3 | 2 | 2 | - | 3 | - | 3 | | | | | 3 | 3 | 2 |
| CO5 | 2 | 2 | | - | - | - | - | 2 | | | | | | 2 | - |

3- Strong;2-Medium;1-Low

## PHYSICS LABORATORY
## (CSE, IT, AIML, EEE, ECE, VLSI)

### List of Experiments

1. Determination of Hall coefficient of a given semiconductor and its charge carrier density
2. V-I Characteristics of Zener diode and Solar cell
3. Air wedge - Determination of thickness of a thin sheet/wire
4. a) Laser- Determination of the wave length of the laser using grating
    b) Optical fibre -Determination of numerical aperture and acceptance angle
5. Magnetic field along the axis of current carrying coil – Stewart and Gee.

**\* SDG: 4- Quality Education**

### CourseDesigners

Dr. V. Vasudevan
Mr.S. Vanchinathan
Dr. P.Suthanthirakumar

## CHEMISTRY LABORATORY
## (CSE, IT, EEE, ECE, AIML, VLSI)

### List of Experiments

1. Estimation of HCl by pH meter.
2. Estimation of mixture of acids by conductivity meter
3. Determination of ferrous ion by Potentiometric titration.
4. Determination of corrosion by weight loss method.
5. Estimation of ferrous ion by spectrophotometer.

**\* SDG 6: Improve Clean Water and Sanitation**
**\* SDG 9: Industry, Innovation, and Infrastructure**
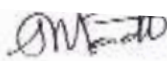**\* SDG 8: Decent Work and Economic Growth**

### Case studies/Activity report

1. Activity using chemdraw software.
2. Activity report on cheminformatic structure.
3. Case study on ion selective electrodes.
4. Assembling of cell or battery.

### Course Designers

1. Dr.T.A.SUKANTHA
2. Dr.B.SRIVIDHYA
3. Dr.K.PRABHA
4. Dr.S.MEENACHI

| 60 IT 0P1 | PYTHON PROGRAMMING LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 4 | 2 |

**Objective**

- To gain the knowledge in Python programming Language
- To understand the concepts decision making and looping statements
- To implement functions with the aid of modules using exception handling
- To implement the concepts of NumPy Arrays
- To create layouts using graphical modules such as Tkinter and Turtle

**Prerequisite**

Basic knowledge of mathematics and programming

**Course Outcomes**

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

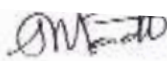| CO1 | Implement the basics and data structures of Python programming | Apply |
|---|---|---|
| CO2 | Implement the concepts of decision making and looping statements | Apply |
| CO3 | Develop programs using functions and modules with exception handling | Apply |
| CO4 | Create programs using NumPy arrays | Apply |
| CO5 | Design layouts with GUI toolkits using Tkinter | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO2 | 3 | 2 | 3 | 2 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO3 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO4 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| CO5 | 3 | 2 | 3 | 3 | | | | | 2 | 2 | 2 | 2 | 3 | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

**K.S.Rangasamy College of Technology – Autonomous R2022**
**60 IT 0P1–Python Programming Laboratory**

Passed in BoS Meeting held on 02/12/23

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| Common to CS, IT, AD | | | | | | | |
|---|---|---|---|---|---|---|---|
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| II | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Implement the basic concepts of Python

2. Implement List, Tuples, Dictionary, and String

3. Implement the concept of decision-making and looping statements.

4. Working with functions and modules

5. Implement File operations

6. Build a program with Exception handling

7. Perform various NumPy operations and special functions

8. Design windows using Tkinter

9. Draw shapes and images using Turtle

10. Mini Project

## Course Designers

1. Dr.C,Nallusamy  - nallusamyc@ksrct.ac.in
2. Mr.R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

| 60 CG 0P1 | CAREER SKILL DEVELOPMENT I | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | CG | 0 | 0 | 2 | 1* |

**Objective**
- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

**Prerequisite**

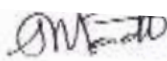Basic knowledge of reading and writing in English.

**Course Outcomes**

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

| CO1 | Listen and comprehend complex academic texts | Understand |
|---|---|---|
| CO2 | Read and infer the denotative and connotative meanings of technical texts | Analyze |
| CO3 | Write definitions, descriptions, narrations, and essays on various topics | Apply |

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| CO4 | Speak fluently and accurately in formal and informal communicative contexts | Apply |
|---|---|---|
| CO5 | Appraise the verbal ability skills in the career development and professional contexts | Analyze |

**Mapping with Programme Outcomes**

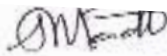| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 2 | 3 | 3 | 2 | 3 | | |
| CO2 | | | | | | | | 2 | 3 | 3 | 2 | 3 | | 2 |
| CO3 | | | | | | | | 2 | 3 | 3 | 2 | 3 | 2 | |
| CO4 | | | | | | | | 2 | 3 | 3 | 2 | 3 | | 2 |
| CO5 | | | | | | | | 2 | 3 | 3 | 2 | 3 | 2 | 2 |

3- Strong; 2-Medium; 1-Some

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 CG 0P1 - Career Skill Development I** | | | | | | | |
| **Common to All Branches** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| II | 0 | 0 | 2 | 30 | 1* | 100 | 0 | 100 |

| **Listening** Listening for general information-specific details - audio / video (formal & informal) - Listen to podcasts/ TED talks/ anecdotes / stories / event narration / documentaries and interviews with celebrities - Listen to a product and process descriptions, advertisements about products or services. | **[5]** |
|---|---|
| **Speaking** Self-Introduction; Introducing a friend; conversation - politeness strategies - Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews - Picture description; giving instruction to use the product; presenting a product - Small Talk; Mini presentations - Group discussions, debates & role plays. | **[5]** |
| **Reading** Loud reading vs Silent reading, Skimming & Scanning of passages, reading brochures (technical context), social media messages relevant to technical contexts and emails - Biographies, travelogues, newspaper reports and travel & technical blogs - Advertisements, gadget reviews and user manuals - Newspaper articles and Journal reports - Editorials; and opinion blogs | **[5]** |
| **Writing** Writing letters – informal and formal – basics and format orientation - paragraph texting, short report on an event (field trip etc.) - Definitions; instructions; and product /process description - Note-making / Note-taking; recommendations; transferring information from non-verbal (charts, graphs to verbal mode) - Essay texting | **[5]** |
| **Verbal Ability I** Reading Comprehension (MCQs) – Cloze Test - Sequencing of sentences – Summarizing and paraphrase – Error Detection – Spelling Test – Sentence Improvement - Preposition | **[5]** |
| **Total Hours** | **25** |

| **Reference(s):** | |
|---|---|
| 1. | 'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, |

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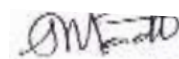
BoS Chairman

| | | |
|---|---|---|
| | Anna University, 2020 | |
| 2. | Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020 | |
| 3. | Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012 | |
| 4. | Lakshmi Narayanan, 'A Course Book on Technical English' Scitech Publications (India) Pvt. Ltd. 2020 | |

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|---|---|---|
| 1 | **Listening** | |
| 1.1 | Listening for general information and Specific details | 1 |
| 1.2 | Listening to podcasts, documentaries and interviews with celebrities | 1 |
| 1.3 | Narrating personal experiences | 1 |
| 1.4 | Reading relevant to technical contexts and emails | 1 |
| 1.5 | Listen to a product and process descriptions | 1 |
| 2 | **Speaking** | |
| 2.1 | Self-introduction | 1 |
| 2.2 | Summarizing of documentaries & Picture Narration | 1 |
| 2.3 | Small Talk; Mini presentations | 1 |
| 2.4 | Group discussions, debates & role plays. | 1 |
| 2.5 | Group discussions | 1 |
| 3 | **Reading** | |
| 3.1 | Loud reading vs Silent reading, Skimming & Scanning of passages | 1 |
| 3.2 | Reading social media messages relevant to technical contexts | 1 |
| 3.3 | Reading newspaper reports and travel & technical blogs | 1 |
| 3.4 | Reading advertisements, gadget reviews and user manuals | 1 |
| 3.5 | Reading newspaper articles and journal reports | 1 |
| 4 | **Writing** | |
| 4.1 | Writing letters – informal and formal | 1 |
| 4.2 | Paragraph Texting | 1 |
| 4.3 | Definitions and instructions | 1 |
| 4.4 | Note-making / Note-taking | 1 |
| 4.5 | Essay texting | 1 |
| 5 | **Verbal Ability** | |
| 5.1 | Reading Comprehension (MCQs) and Cloze Test | 1 |
| 5.2 | Sequencing of sentences | 1 |
| 5.3 | Paraphrasing and Summarizing | 1 |
| 5.4 | Error Detection and Spelling Test | 1 |
| 5.5 | Prepositions | 1 |
| | **Total** | **25** |

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**Course Designer**

1. Dr.A.PALANIAPPAN     - palaniappan@ksrct.ac.in

| 60 MA 014 | PROBABILITY AND RANDOM PROCESSES | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 3 | 1 | 0 | 4 |

**Objective**

- To learn the basic concepts of probability and random variables.
- To impart knowledge on standard distributions.
- To familiarize various methods in hypothesis testing.
- To get exposed to the fundamentals of analysis of variance.
- To learn fundamentals of random processes.

**Prerequisite**

NIL

**Course Outcomes**

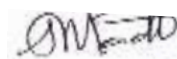On the successful completion of the course, students will be able to

| CO1 | Understand the basic concepts of probability and random variables. | Remember, Understand, Apply |
|---|---|---|
| CO2 | Understand the basic concepts of standard distributions. | Remember, Understand, ,Apply |
| CO3 | Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis. | Remember, Understand, Apply |
| CO4 | Apply the concepts of ANOVA to test the equality of means for more than two populations. | Remember, Understand, Apply |
| CO5 | Understand the fundamentals of random processes. | Remember, Understand |

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 1 | | | | | | | 2 | | 3 |
| CO2 | 3 | 3 | 3 | 2 | 2 | | | | | | | 2 | | 3 |
| CO3 | 3 | 3 | 3 | 3 | 2 | | | | | | 2 | 2 | | 3 |
| CO4 | 3 | 3 | 2 | 3 | 2 | | | | | | 2 | 2 | | 3 |
| CO5 | 3 | 3 | 2 | 2 | 1 | | | | | | | 2 | | 2 |

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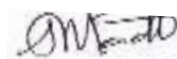
BoS Chairman

3 - Strong;2 - Medium;1 - Some

**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | Model Exam (Marks) | End Sem Examination (Marks) |
|---|---|---|---|---|
| | **1** | **2** | | |
| Remember (Re) | 10 | 10 | 10 | 10 |
| Understand (Un) | 20 | 20 | 30 | 30 |
| Apply (Ap) | 30 | 30 | 60 | 60 |
| Analyze (An) | 0 | 0 | 0 | 0 |
| Evaluate (Ev) | 0 | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 | 0 |
| Total | 60 | 60 | 100 | 100 |

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|---|
| **60 MA 014 - Probability  and Random Processes** |
| **Common to Artificial Intelligence and Data Science& Artificial Intelligence and Machine Learning** |

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 1 | 0 | 60 | 4 | 40 | 60 | 100 |

| | |
|---|---|
| **Probability and Random Variables**<br>Axioms of probability - Conditional probability - Baye's theorem - Random variable - Probability mass function - Probability density function - Expectation - Moment generating function. | **[9]** |
| **Standard Distributions**<br>Discrete Distributions: Binomial distribution - Poisson distribution - Geometric distribution. Continuous Distributions: Uniform distribution -  Exponential distribution  - Normal distribution . | **[9]** |
| **Testing of Hypothesis**<br>Type I and Type II errors  - Test of significance of small samples - Student's 't' test - Single mean - Difference of means - F- test - Chi-square test - Goodness of fit - Independence of attributes | **[9]** |
| **Design of Experiments**<br>Analysis of variance: One way classification - Completely randomized design - Two way classification -  Randomized block design - Latin square design. | **[9]** |
| **Random Processes**<br>Classification of random processes -  First order and second order process - Strictly sense stationary process - Wide-sense stationary process - Autocorrelation function and its properties - Markov process -  Markov chain. | **[9]** |
| **Total Hours: 45 + 15 (Tutorial)** | **60** |

**Textbook(s):**

| 1. | S.P.Gupta, "Statistical Methods", Sultan Chand & sons, 46thRevised Edition, New Delhi, 2021. |
|---|---|
| 2. | O.C.Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Edition, Academic Press, 2014. |

**Reference(s):**

| 1. | S.Ross, "A First Course in Probability", Pearson Education India, 9th Edition, New Delhi, 2014. |
|---|---|
| 2. | Richard A.Johnson, "Miller& Freund'sProbability and Statistics for Engineers", Pearson Education India, 9th  Edition, New Delhi, 2016. |
| 3. | Michael Mitzenmacher and Eli Upfal, "Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis", Cambridge University Press, 2nd Edition, 2017. |
| 4. | Peyton Z. Peebles Jr, "Probability, Random Variables and Random Signal Principles",McGraw |

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| | Hill Education, 4th Edition, New Delhi, 2017. |
|---|---|
| 5. | T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Education, 4th Edition, New Delhi, 2014. |

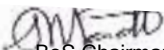**List of MATLAB Programs:**

1. Evaluate the probability density function for the sample data.
2. Estimate probability distribution parameters from sample data.
3. Compute the probability density functions of a standard normal distribution with parameters.
4. Use two-sample F-test to test if the variances of two populations are equal.
5. Determine whether data from several groups of a factor have a common mean by using one-way ANOVA.

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Probability and Random Variables** | |
| 1.1 | Axiomatic probability – Conditional probability | 1 |
| 1.2 | Baye's theorem | 1 |
| 1.3 | Random variable | 1 |
| 1.4 | Probability mass function | 1 |
| 1.5 | Probability density function | 1 |
| 1.6 | Tutorial | 2 |
| 1.7 | Expectation | 1 |
| 1.8 | Moment generating function | 1 |
| 1.9 | Tutorial | 2 |
| **2** | **Standard Distributions** | |
| 2.1 | Discrete Distributions: Binomial distribution | 1 |
| 2.2 | Poisson distribution | 2 |
| 2.3 | Geometric distribution | 1 |
| 2.4 | Tutorial | 2 |
| 2.5 | Continuous Distributions: Uniform distribution | 1 |
| 2.6 | Exponential distribution | 1 |
| 2.7 | Normal distribution | 2 |
| 2.8 | Tutorial | 2 |
| **3** | **Testing of Hypothesis** | |
| 3.1 | Type I and Type II errors | 1 |
| 3.2 | Test of significance of small samples | 1 |
| 3.3 | Student's 't' test | 2 |
| 3.4 | Single mean | 1 |
| 3.5 | Tutorial | 2 |
| 3.6 | F- test | 1 |
| 3.7 | Chi-square test for goodness of fit and independence of attributes | 2 |
| 3.8 | Tutorial | 2 |
| **4** | **Design of Experiments** | |
| 4.1 | Analysis of variance | 1 |
| 4.2 | One-way classification | 1 |
| 4.3 | Completely Randomized Design | 1 |
| 4.4 | Two-way classification | 2 |
| 4.5 | Tutorial | 2 |
| 4.6 | Randomized Block Design | 1 |
| 4.7 | Latin square design | 2 |
| 4.8 | Tutorial | 2 |

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| 5 | **Random Processes** | |
|---|---|---|
| 5.1 | Classification of random processes | 1 |
| 5.2 | First order and second order process | 1 |
| 5.3 | Strict sense stationary process | 1 |
| 5.4 | Wide-sense stationary process | 1 |
| 5.5 | Tutorial | 2 |
| 5.6 | Autocorrelation function and its properties | 1 |
| 5.7 | Markov process | 1 |
| 5.8 | Markov chain | 1 |
| 5.9 | Tutorial | 2 |
| | **Total** | **60** |

## Course Designers

**Dr.D.TAMIZHARASAN**-tamizharasan@ksrct.ac.in

| 60 CS 003 | **DATA STRUCTURES** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 3 | 0 | 0 | 3 |

## Objective

- To choose the appropriate data structure for a specified application

- To design and implement abstract datatypes such as Linked List, Stack, Queue and Trees

- To Learn and implement the Hashing techniques

- To design a Priority Queue ADT and its applications

- To demonstrate various Sorting, Searching and Graph algorithms

## Prerequisite

Basic knowledge of mathematics and programming language in C

## Course Outcomes

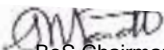On the successful completion of the course, students will be able to

| CO1 | Apply linear data structures to solve real time applications | Apply |
|---|---|---|
| CO2 | Experiment with trees and its operations | Apply |
| CO3 | Apply algorithm for solving problems like Sorting and Searching | Apply |
| CO4 | Implement Priority Queue with its operations and Hashing Techniques | Apply |
| CO5 | Explain Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity | Apply, Analyze |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 2 | | | 2 | 2 | | | 2 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 3 | 2 | | | 2 | 3 | | | 2 | 3 | 3 |
| CO3 | 3 | 3 | 2 | 2 | 2 | 2 | | 2 | 3 | 2 | | 2 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 3 | 2 | | | 3 | 2 | 2 | | 2 | 3 | 3 |

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| CO5 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | | 2 | 3 | 3 |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

3- Strong;2-Medium;1-Some

**Assessment Pattern**

| Cognitive Levels | Continuous Assessment Tests | | End Semester Examination(Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember | 10 | 10 | 20 |
| Understand | 10 | 10 | 20 |
| Apply | 30 | 30 | 40 |
| Analyse | 10 | 10 | 20 |
| Evaluate | - | - | - |
| Create | - | - | - |

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|---|
| **60 CS 003 – DATA STRUCTURES** |
| **Common to CS, IT, AD, AM, EE** |

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Lists, Stacks and Queues** <br> Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT. | [12] |
| **Trees** <br> Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – B–Trees – B+ Trees. | [9] |
| **Sorting and Searching** <br> Preliminaries – Insertion Sort – Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting – Searching: Sequential Search - Binary Search – Hashed List Searches. | [7] |
| **Hashing and Priority Queues (Heaps)** <br> Hashing – Hash Function – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing – Priority Queues (Heaps) – Model – Simple Implementations –Binary Heap–Applications of Priority Queues – d-Heaps. | [7] |
| **Graphs** <br> Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity. | [10] |
| **Total Hours** | 45 |
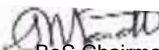
**Text Book(s):**

| 1. | M.A.Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2008. |
|---|---|
| 2. | Y.Langsam, M.J.Augenstein and A.M.Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009. |

**Reference(s):**

| 1. | Rajesh K.Sukla,"Data Structure using C & C++", Wiley India, 2012. |
|---|---|
| 2. | A.Tannenbaum, "Data Structure using C", Pearson Education, 2003. |
| 3. | Goodrich and Tamassia, "Data Structures and Algorithms in C++", Second Edition, John Wiley and Sons, 2011 |
| 4. | Reema Thareja, "Data Structures using C", Second Edition, Oxford Higher Education, 2014. |

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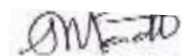BoS Chairman

**Course Contents and Lecture Schedule**

| Module No. | Topic | No. of Hours |
|---|---|---|
| 1 | **Lists, Stacks and Queues** | |
| 1.1 | Abstract Data Type (ADT) | 2 |
| 1.2 | List ADT | 4 |
| 1.3 | Stack ADT | 3 |
| 1.4 | Queue ADT | 3 |
| 2 | **Trees** | |
| 2.1 | Preliminaries | 1 |
| 2.2 | Binary Trees | 1 |
| 2.3 | The Search Tree ADT | 1 |
| 2.4 | Binary Search Trees | 1 |
| 2.5 | AVL Trees | 1 |
| 2.6 | Tree Traversals | 1 |
| 2.7 | B-Trees | 2 |
| 2.8 | B+ Trees | 1 |
| 3 | **Sorting and Searching** | |
| 3.1 | Preliminaries, Insertion Sort | 1 |
| 3.2 | Shell Sort, Heap sort | 1 |
| 3.3 | Merge Sort, Quick sort | 1 |
| 3.4 | External Sorting | 1 |
| 3.5 | Sequential Searching | 1 |
| 3.6 | Binary Searching | 1 |
| 3.7 | Hashed List Searches | 1 |
| 4 | **Hashing and Priority Queues (Heaps)** | |
| 4.1 | Hashing, Hash Function | 1 |
| 4.2 | Separate Chaining, Open Addressing | 1 |
| 4.3 | Rehashing, Extendible Hashing | 1 |
| 4.4 | Priority Queues (Heaps) | 1 |
| 4.5 | Simple Implementations, Binary Heap | 1 |
| 4.6 | Applications of Priority Queues | 1 |
| 4.7 | d –Heaps | 1 |
| 5 | **Graphs** | |
| 5.1 | Graph Definitions - Topological Sort | 1 |
| 5.2 | Shortest-Path Algorithms | 1 |
| 5.3 | Unweighted Shortest Paths | 1 |
| 5.4 | Dijkstra's Algorithm | 1 |
| 5.5 | Minimum Spanning Tree | 1 |
| 5.6 | Prim's Algorithm | 1 |
| 5.7 | Kruskal's Algorithm | 1 |
| 5.8 | Applications of Depth-First Search | 1 |
| 5.9 | Undirected Graphs | 1 |
| 5.10 | Biconnectivity | 1 |
| | **Total Hours** | **45** |

**Course Designers**

1. Ms.J.MYTHILI- mythili@ksrct.ac.in

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

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| 60 CS 004 | JAVA PROGRAMMING | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 3 | 0 | 0 | 3 |

## Objective

- To learn object oriented programming concepts
- To understand Java fundamentals and String Methods
- To implement code reduction through packages and collection methods
- To apply the knowledge of Threads and IO streams
- To build applications with JDBC technology for real world problems

## Prerequisite

Basic knowledge of any programming language with ability to solve logical problems

## Course Outcomes

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

| CO1 | Apply Java fundamentals to construct functional programs to solve real-world problems, | Apply |
|---|---|---|
| CO2 | Implement object-oriented principles, exception handling and string operations to solve real world problems | Apply |
| CO3 | Design packages and utilize collections to achieve reusability. | Apply |
| CO4 | Apply multithreading concepts and IO Streams in various real world scenario | Apply |
| CO5 | Explore database using regular expression with JDBC | Analyze |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | | |
| CO2 | 3 | 3 | 2 | | 3 | | | 2 | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO3 | 2 | 3 | 3 | | 3 | | | 2 | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO4 | 3 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO5 | 2 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | | |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | | |
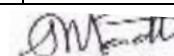
## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | Model Exam | End Sem Examination (Marks) |
|---|---|---|---|---|
| | 1 | 2 | | |
| Remember (Re) | 10 | 10 | 10 | 10 |
| Understand (Un) | 10 | 10 | 10 | 10 |
| Apply (Ap) | 40 | 40 | 60 | 70 |
| Analyze (An) | - | - | 20 | 10 |
| Evaluate (Ev) | - | - | - | - |
| Create (Cr) | - | - | - | - |

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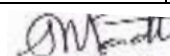
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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 CS 004 - JAVA PROGRAMMING** | | | | | | | |
| | **COMMON TO CS, IT, AM & AD** | | | | | | | |

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **INTRODUCTION OF JAVA FUNDAMENTALS AND OOP:**<br>Features of Java, The Java Environment, Java Source File Compilation, Structure of Java, Data Types, Variables, Operators, Control Flow, Arrays, Concepts of Object-Oriented Programming - OOP in Java, Defining classes and methods in Java, constructors, access specifiers, final and static keywords. | **[9]** |
| **JAVA OOP CONCEPTS AND STRINGS:**<br>Java Inheritance, Polymorphism, Interfaces, Abstract class, Exception handling - exception hierarchy, throwing and catching exceptions, built-in exceptions, creating own exceptions, String handling with String and String Buffer classes. | **[9]** |
| **PACKAGES AND COLLECTION FRAMEWORK**<br>Packages – Pre defined and user defined Packages, Boxing and Unboxing, Wrapper classes, Introduction to Collection, The Collection Interfaces – List, Set, Map, Generic Class, Vector, Iterator and ListIterator, String Tokenizer. | **[9]** |
| **JAVA MULTITHREAD AND I/O STREAMS**<br>Multithreaded programming-The Java Thread Model-Lifecycle, The Main Thread, creating a Thread, Creating multiple Threads, Thread priority, Input / Output Basics, Streams, The Byte Streams, The Character Streams, Reading and Writing Console, Reading and Writing Files, Object Serialization and Object De-Serialization. | **[9]** |
| **JAVA DATABASE CONNECTIVITY AND REGEX**<br>Database Programming – Introduction, SQL queries, JDBC, Statement, Prepared Statement, Regular Expression: Matcher Class, Pattern class and Pattern Syntax, Exception class, Regex Character Classes and Quantifiers, Metacharacters. | **[9]** |
| **Total Hours** | **45** |

| | Textbook(s): |
|---|---|
| 1. | Herbert Schildt, "Java : The complete Reference", Comprehensive coverage of the Java language,Oracle press, 12th Edition, Tata McGraw-Hill, 2021. |
| 2. | Vivian Siahaan, Rismon Hasiholan Sianipar, "Java In Practice: JDBC And Database Applications"Sparta Publishing, Kindle 1st Edition, 2019 |

| | Reference(s): |
|---|---|
| 1. | Kathy Sierra ,Bert Bates, "Head First Java", A Brain Friendly Guide, O'Reilly, 3nd Edition, 2022 |
| 2. | Cay S.Horstmann, " Core Java Volume – I Fundamentals",' 11th Edition, 2018 |
| 3. | Y.Daniel Liang, "Introduction to Java Programming", Comprehensive Version,10th Edition, Pearson Education,2015 [JDBC only] |
| 4. | Jeffrey E. F. Friedl, "Mastering Regular Expressions", 3rdEdition, O'Reilly Media, Inc.,2006 |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No. of Hours |
|---|---|---|
| 1.0 | **Introduction to OOP and Java Fundamentals** | |

| | | | |
|---|---|---|---|
| 1.1 | Features of Java , The Java Environment | | 1 |
| 1.2 | Structure of Java, Data Types, Variables | | 1 |
| 1.3 | Operators, Control Flow | | 1 |
| 1.4 | Arrays | | 1 |
| 1.5 | Object Oriented Programming - Objects and Classes | | 1 |
| 1.6 | OOP in Java | | 1 |
| 1.7 | Defining classes and methods in Java | | 1 |
| 1.8 | Constructors | | 1 |
| 1.9 | Access specifiers, Final, Static Keywords | | 1 |
| **2.0** | **Java Concepts and Strings** | | |
| 2.1 | Java Inheritance | | 1 |
| 2.2 | Polymorphism | | 1 |
| 2.3 | Interfaces, Abstract class | | 1 |
| 2.4 | Exception handling- built-in exceptions | | 1 |
| 2.5 | Try, Catch, Finally | | 1 |
| 2.6 | Throw, Throws | | 1 |
| 2.7 | Creating own exceptions | | 1 |
| 2.8 | String Methods | | 1 |
| 2.9 | String Buffer | | 1 |
| **3.0** | **Packages And Collection Framework** | | |
| 3.1 | Packages | | 1 |
| 3.2 | User defined Packages | | 1 |
| 3.3 | Boxing and Unboxing | | 1 |
| 3.4 | Wrapper classes | | 1 |
| 3.5 | Introduction to Collection | | 1 |
| 3.6 | Set, List, Map | | 2 |
| 3.7 | Vector | | 1 |
| 3.8 | Iterator | | 1 |
| **4.0** | **Java Multithreading and Stream IO** | | |
| 4.1 | The Java Thread Model-Lifecycle | | 1 |
| 4.2 | The Main Thread | | 1 |
| 4.3 | Creating a thread | | 1 |
| 4.4 | Creating Multiple Thread | | 1 |
| 4.5 | Thread Priority | | 1 |
| 4.6 | IO Basics | | 1 |
| 4.7 | Reading and Writing Console | | 1 |
| 4.8 | Reading and Writing Files | | 1 |
| 4.9 | Object Serialization and Object De-Serialization. | | 1 |
| **5.0** | **Regex and Java Database Connectivity** | | |
| 5.1 | Database Programming – Introduction | | 1 |
| 5.2 | SQL queries | | 1 |
| 5.3 | JDBC | | 1 |
| 5.4 | Statement | | 1 |
| 5.5 | Prepared Statement | | 1 |
| 5.6 | Regular Expression: Matcher Class, Pattern class | | 1 |
| 5.7 | Pattern Syntax, Exception class | | 1 |
| 5.8 | Regex Character Classes and Quantifiers | | 1 |
| 5.9 | Meta characters | | 1 |
| | **Total** | | **45** |

## Course Designers

1. Mr.S.Vadivel –  vadivels@ksrct.ac.in

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| 60 AM 301 | FORMAL LANGUAGE AND AUTOMATA THEORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 3 | 1 | 0 | 4 |

### Objective

- To understand the types of finite automata and the relationship between finite automata
- To understand regular expressions, push down automata and context free grammar
- To understand the properties of context free language
- To learn the programming techniques of Turing machine and undecidable problems
- To learn the concepts of Undecidability and interactable Problems

### Prerequisite

Basic Knowledge of mathematics and Computer Systems

### CourseOutcomes

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

| CO1 | Comprehend the formal proofs, Inductive proofs and Finite Automata | Apply |
|---|---|---|
| CO2 | Understand regular expressions and the properties of regular languages | Apply |
| CO3 | Construction of context-free grammar and Push-down automata | Apply, Analyze |
| CO4 | Interpret the uses of Turing machine and properties of Context-Free Languages | Apply, Analyze |
| CO5 | Recognize the undecidability, and Interactable problems | Apply, Analyze |

### Mapping with Programme Outcomes

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | | | | 1 | | | 2 | | 2 | 2 |
| CO2 | 3 | 3 | 2 | 2 | | | | | | | | | 2 | 2 |
| CO3 | 3 | 3 | 2 | | | | | 2 | | | 2 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 2 | | | | | 3 | 1 | 2 | | | 2 | 2 |
| CO5 | 3 | 3 | 2 | | | | | - | 2 | | 2 | | 2 | 2 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |
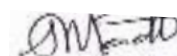
### Assessment Pattern

| Cognitive Levels | Continuous AssessmentTests | | End Semester Examination(Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember | 10 | 5 | 15 |
| Understand | 10 | 10 | 20 |
| Apply | 30 | 35 | 45 |
| Analyse | 10 | 10 | 20 |
| Evaluate | - | - | - |
| Create | - | - | - |
| Total | 60 | 60 | 100 |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

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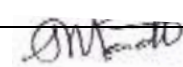| K.S.Rangasamy College of Technology–Autonomous R 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 60 AM 301-Formal Language and Automata Theory | | | | | | | |
| AIML | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 1 | 0 | 45 | 4 | 40 | 60 | 100 |

**Introduction to Automata**
Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA): Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.  [6]

**Regular Expressions and Languages**
Regular Expression – Finite Automata and Regular Expressions – Properties of regular languages: Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.  [7]

**Context-Free Grammar and Languages**
Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages  [5]

**Pushdown Automata** Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and Context Free Grammars - Deterministic Pushdown Automata.  [7]

**Properties of Context-Free Languages**
Normal forms for Context Free Grammars – Pumping Lemma for Context Free Languages - Closure Properties of Context Free Languages  [5]

**Turing Machines**The Turing Machines – Programming Techniques for
Turing Machine.  [6]

**Undecidability**
A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem  [5]

**Interactable Problems**
The classes Polynomial Time (P) and Nondeterministic Polynomial Time(NP).  [4]

| | Total Hours | 45 |
|---|---|---|

**TextBook(s):**

| 1. | J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2008. |
|---|---|
| 2 | Anil Maheshwari Michiel Smid ," Introduction to Theory of Computation " School of Computer Science Carleton University ,2019 |

**Reference(s):**

| 1. | Sipser Michael, "Introduction to the Theory of Computation", Third Edition, Thomson Press (India) Ltd. |
|---|---|
| 2. | J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, McGraw Hill Education, 2007. |
| 3. | H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pears Education/PHI, 2003 |

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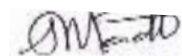
BoS Chairman

| 4. | Karibasappa K.G. Basavaraj S.Anami , "Formal Languages and Automata Theory",first edition, wiley publisher,2011 |

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|------|-------|-------------|
| 1 | **Introduction to Automata** | |
| 1.1 | Introduction to formal proof | 1 |
| 1.2 | Additional forms of proof | 1 |
| 1.3 | Inductive proofs | 1 |
| 1.4 | Finite Automata (FA): Deterministic Finite Automata (DFA) | 1 |
| 1.5 | Non-deterministic Finite Automata (NFA) | 2 |
| 1.6 | Finite Automata with Epsilon transitions. | 1 |
| 2 | **Regular Expressions and Languages** | |
| 2.1 | Regular Expression | 1 |
| 2.2 | Finite Automata and Regular Expressions | 2 |
| 2.3 | Properties of regular languages: Proving languages not to be regular | 2 |
| 2.4 | Closure properties of regular languages | 1 |
| 2.5 | Equivalence and minimization of Automata. | 2 |
| 3 | **Context-Free Grammar and Languages** | |
| 3.1 | Context-Free Grammar (CFG) | 2 |
| 3.2 | Parse Trees | 1 |
| 3.3 | Ambiguity in grammars and languages | 2 |
| 4 | **Pushdown Automata** | |
| 4.1 | Definition of the Pushdown automata | 1 |
| 4.2 | Languages of a Pushdown Automata | 2 |
| 4.3 | Equivalence of Pushdown automata and Context Free Grammars | 2 |
| 4.4 | Deterministic Pushdown Automata. | 2 |
| 5 | **Properties of Context-Free Languages** | |
| 5.1 | Normal forms for Context Free Grammars | 1 |
| 5.2 | Pumping Lemma for Context Free Languages | 2 |
| 5.3 | Closure Properties of Context Free Languages | 1 |
| 6 | **Turing Machines** | |
| 6.1 | The Turing Machines | 2 |
| 6.2 | Programming Techniques for Turing Machine | 2 |
| 7 | **Undecidability** | |
| 7.1 | A language that is not Recursively Enumerable (RE) | 1 |
| 7.2 | An undecidable problem that is RE | 1 |
| 7.3 | Undecidable problems about Turing Machine | 2 |
| 7.4 | Post's Correspondence Problem | 2 |
| 8 | **Interactable Problems** | |

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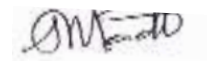| 8.1 | The classes Polynomial Time (P) and Nondeterministic Polynomial Time(NP). | 3 |
| | **Total** | 45 |

## Course Designers

1. Mr.R.VijaySai - vijaysair@ksrct.ac.in

| 60 AM 302 | COMPUTER ARCHITECTURE | Category | L | T | P | Credit |
|-----------|----------------------|----------|---|---|---|--------|
|           |                      | PC       | 3 | 0 | 0 | 3      |

**Objective**

- To gain the knowledge about basic structure, Instructions and functional units of a digital computer
- Discuss in detail the operation of the arithmetic unit including the algorithms and implementation of data manipulation.
- To study in detail the different types of control and the concept of pipelining and study the hierarchical memory system, cache memory
- Study the different ways of communicating with I/O devices and standard I/O interfaces
- To understand the instruction and thread level parallelism concepts and multi core processors

**Prerequisite**

Basic knowledge of Software and Hardware

**CourseOutcomes**

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

| CO1 | Determine the basic structure of computer, Instruction sequencing and Addressing modes. | Apply |
|-----|------|-------|
| CO2 | Execute the basic design of Addition and subtraction for fixed point numbers, multiplication and division of fixed numbers and basics of floating point numbers | Apply |
| CO3 | Explain the concept of  Instruction execution, generation of control signals, pipelining and hazards. | Analyze |
| CO4 | Implement the concept of Cache memory and its performance, interrupts, buses, Direct Memory Access and Standard I/O Interfaces. | Apply |
| CO5 | Illustrate Parallelism concepts, compiler techniques, multiprocessor architecture and case studies on Intel's processors. | Analyze |

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|------|------|------|
| CO1 | 3 | 3 | 2 |   | 2 | 2 | 2 |   | 3 |   |   | 2 |   | 2 |
| CO2 | 3 | 3 | 2 |   | 2 | 2 | 2 |   | 3 |   |   | 2 | 3 | 3 |
| CO3 | 3 | 3 | 2 |   | 2 |   |   |   |   |   |   |   | 2 | 3 |
| CO4 | 3 | 3 | 2 |   | 2 | 2 | 2 |   | 3 |   |   |   |   | 3 |
| CO5 | 3 | 3 | 2 |   | 2 | 2 | 2 |   |   |   |   |   |   | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

**Assessment Pattern**
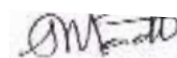
| Cognitive Levels | Continuous Assessment Tests | End Semester |
|------------------|-----------------------------|--------------|

|  | 1 | 2 | 3 | Examination(Marks) |
|---|---|---|---|---|
| Remember | 10 | 10 | 20 | 10 |
| Understand | 10 | 10 | 20 | 10 |
| Apply | 20 | 20 | 30 | 20 |
| Analyse | 20 | 20 | 30 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| K.S.Rangasamy College of Technology–AutonomousR2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 302 - Computer Architecture** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Basic Structure of Computers**
Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses–Memory operations –Instruction and instruction sequencing–Addressing modes–Assembly language–Basic I/O operations – Stacks and queues [9]

**Arithmetic Unit**
Addition and subtraction of signed numbers–Design of fast adders–Multiplication of positive numbers-Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations. [9]

**Basic Processing Unit**
Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control-Pipelining–Basic concepts–Data hazards–Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation. [9]

**Memory and I/O Systems**
Speed, Size, Cost– Cache memories – Performance considerations – Accessing I/O Devices – Interrupts – Direct Memory Access – Buses– Interface Circuits– PCI,USB. [9]

**AdditionalTopics**
Instruction Level Parallelism: ILP concepts –Pipelining overview-Compiler Techniques for Exposing ILP –Dynamic Branch Prediction – Dynamic Scheduling -Hardware Based Speculation – Static scheduling – Thread Level Parallelism: Symmetric and Distributed Shared Memory Architectures – Case studies: Intel core i7, Atom Processors [9]

| | **Total Hours** | 45 |
|---|---|---|

**Text Book(s):**

1. CarlHamacher,Zvonko Vranesi candSafwatZaky,6thEdition"ComputerOrganization",McGraw-Hill, 2012.

2. David A.Patterson and John L.Hennessy,"Computer Organization and Design: The hardware/software interface",5thEdition, Morgan Kaufmann,2014

**Reference(s):**

1. William Stallings, "Computer Organization and Architecture –DesigningforPerformance",9thEdition, Pearson Education, 2012.

2. JohnP.Hayes,"ComputerArchitectureandOrganization",3rdEdition,McGrawHill,2012.

3. http://www.ni.com/white-paper/11266/en/#toc1

4. https://techreport.com/review/15818/intel-core-i7-processors
https://www.intel.in/content/www/in/en/products/processors/atom.html

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**Course Contents and Lecture Schedule**
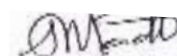
| S.No | Topic | No.of Hours |
|------|-------|-------------|
| **1** | **Basic Structure of Computers** | |
| 1.1 | Functional units - Basic operational concepts | 1 |
| 1.2 | Bus structures | 1 |
| 1.3 | Software performance | 1 |
| 1.4 | Memory locations and addresses | 1 |
| 1.5 | Memory operations | 2 |
| 1.6 | Instruction and instruction sequencing | 1 |
| 1.7 | Addressing modes–Assembly language | 1 |
| 1.8 | Basic I/O operations – Stacks and queues | 1 |
| **2** | **Arithmetic Unit** | |
| 2.1 | Addition and subtraction of signed numbers | 1 |
| 2.2 | Design of fast adders | 2 |
| 2.3 | Multiplication of positive numbers | 2 |
| 2.4 | Signed operand multiplication and fast multiplication | 1 |
| 2.5 | Integer division | 1 |
| 2.6 | Floating point numbers | 1 |
| 2.7 | operations | 1 |
| **3** | **Basic Processing Unit** | |
| 3.1 | Fundamental concepts | 1 |
| 3.2 | Execution of a complete instruction | 1 |
| 3.3 | Multiple bus organization | 1 |
| 3.4 | Hardwired control, Micro programmed control | 1 |
| 3.5 | Pipelining–Basic concepts | 1 |
| 3.6 | Data hazards–Instruction hazards | 1 |
| 3.7 | Influence on Instruction sets | 1 |
| 3.8 | Data path and control consideration | 1 |
| 3.9 | Superscalar operation | 1 |
| **4** | **Memory and I/O Systems** | |
| 4.1 | Speed, Size, Cost | 1 |
| 4.2 | Cache memories | 1 |
| 4.3 | Performance considerations | 1 |
| 4.4 | Accessing I/O Devices | 1 |
| 4.5 | Interrupts | 2 |
| 4.6 | Direct Memory Access | 1 |
| 4.7 | Buses, Interface Circuits | 1 |
| 4.8 | PCI,USB | 1 |
| **5** | **Additional Topics** | |
| 5.1 | ILP concepts | 1 |
| 5.2 | Pipelining overview | 1 |
| 5.3 | Compiler Techniques for Exposing ILP | 1 |
| 5.4 | Dynamic Branch Prediction | 1 |
| 5.5 | Dynamic Scheduling | 1 |
| 5.6 | Hardware Based Speculation | 1 |
| 5.7 | Static scheduling | 1 |

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| 5.8 | Thread Level Parallelism | 1 |
| 5.9 | Symmetric and Distributed Shared Memory Architectures | 1 |
| 5.10 | Case studies: Intel core i7, Atom Processors | 1 |

## Course Designers

1. Saradha.M  - saradha@ksrct.ac.in

| 60 MY 002 | UNIVERSAL HUMAN VALUES | Category | L | T | P | Credit |
|-----------|------------------------|----------|---|---|---|--------|
|           |                        | MC | 3 | 0 | 0 | 3 |

### Objective

- To identify the essential complementarily between 'values' and 'skills'
- To ensure core aspirations of all human beings.
- To acquire ethical human conduct, trustful and mutually fulfilling human behaviour
- To enrich interaction with Nature
- To achieve holistic perspective towards life and profession

### Prerequisites

NIL

### Course Outcomes

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

| CO1 | Understand the significance of value inputs in formal education and start applying them in their life and profession | Understand |
| CO2 | Evaluate coexistence of the "I" with the body. | Analyze |
| CO3 | Identify and evaluate the role of harmony in family, society and universal order. | Analyze |
| CO4 | Classify and associate the holistic perception of harmony at all levels of existence and Nature | Analyze |
| CO5 | Develop appropriate human conduct and management patterns to create harmony in professional and personal lives. | Create |

### Mapping with Programme Outcomes

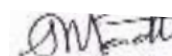| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 |     |     |     |     |     |     |     | 3 | 2 |      | 2 | 3 |
| CO2 |     |     |     |     |     | 3 |     | 3 | 3 |      |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

3- Strong; 2-Medium; 1-Some

### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests(Marks) | | | End Semester Examination(Marks) |
|------------------|------|------|-------|--------------------------------|
|                  | 1 | 2 | Model | |

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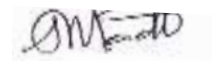
BoS Chairman

| | | | | |
|---|---|---|---|---|
| Remember | 10 | 10 | 20 | |
| Understand | 10 | 10 | 20 | No End Semester Examination |
| Apply | 20 | 20 | 30 | |
| Analyse | 20 | 20 | 30 | |
| Evaluate | 0 | 0 | 0 | |
| Create | 0 | 0 | 0 | |

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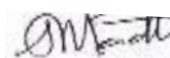| K. S. Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 MY 002 -  UNIVERSAL HUMAN VALUES** | | | | | | | |
| **Common to all** | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | |
| | L | T | P | | C | CA | ES | Total |
| III | 3 | 0 | 0 | 45 | 3* | 100 | 0 | |

**Introduction to value Education**
Understanding  value Education-Self exploration as the process for value education-Continuous Happiness and prosperity-the basic human aspirations-right understanding-relationship and physical facility –happiness and prosperity - current  scenario – method to fulfill the basic human aspirations **[9]**

**Harmony in the Human Being**
Understanding Human being as the Co-Existence of the self and the Body-Distinguishing between the needs of the self and the body-the body as an instrument of the self-understanding harmony in the self-harmony of the self with the body – programme to ensure self-regulation and health **[9]**

**Harmony in the Family and Society**
Harmony in the Family –the basic unit of human interaction-values in human- to - human relationship –'Trust' the foundation value in relationship –'Respect'- as the right evaluation-understanding harmony in the society –vision for the universal human order. **[9]**

**Harmony in the Nature/Existence**
Understanding harmony in the Nature-Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature – realizing existence as co-existence at all levels –the holistic perception of harmony in existence. **[9]**

**Implications of the Holistic Understanding**
Natural Acceptance of human values- definitiveness of human conduct- a basis for humanistic education, humanistic constitution and universal human order- competence in professional ethics – holistic technologies, production systems and management models-typical case studies – strategies for transition towards value base life and profession **[9]**

| | **Total Hours** | **45** |
|---|---|---|

**Text Book(s):**

| 1. | A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 |
|---|---|
| 2 | Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, |

**Reference(s):**

| 1. | Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. |
|---|---|
| 2. | Human Values, A.N. Tripathi, New Age International. Publishers, New Delhi, 2004. |

**Course Contents and Lecture Schedule**

| S.No | Topic | No. of Hours |
|---|---|---|
| **1** | **INTRODUCTION TO VALUE EDUCATION** | |
| 1.1 | Discussion on Present Education System and Skill Based Education | 1 |
| 1.2 | Understanding  Value Education | 1 |
| 1.3 | Self exploration as the process for value education | 1 |
| 1.4 | Basic Human Aspirations - Continuous Happiness and Prosperity | 1 |

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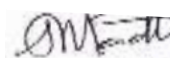Approved in Academic Council Meeting held on 23/12/23

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| 1.5 | Basic requirements to fulfill Human Aspirations - Right understanding, Relationship and Physical facility | 1 |
|------|------|------|
| 1.6 | Transformation from Animal Consciousness to Human Consciousness | 1 |
| 1.7 | Sources of Happiness and Prosperity – Harmony and Disharmony | 1 |
| 1.8 | Current Scenario and Role of Education | 1 |
| 1.9 | Outcome of Human Education and Method to fulfill the basic human aspirations | 1 |
| **2** | **HARMONY IN THE HUMAN BEING** | |
| 2.1 | Understanding Human being  -  As Co-Existence of the self and the Body - The Needs of the Self and the Body | 1 |
| 2.2 | Understanding Human being  -  As Co-Existence of the self and the Body - The Activities and Response of the Self and the Body | 2 |
| 2.3 | The body as an instrument of the self | 1 |
| 2.4 | Understanding harmony in the self | 1 |
| 2.5 | Harmony of the self with the body | 2 |
| 2.6 | Programme to ensure self-regulation and health | 1 |
| 2.7 | My Participation (Value) regarding Self and my Body - Correct Appraisal of our Physical needs | 1 |
| 3 | **HARMONY IN THE FAMILY AND SOCIETY** | |
| 3.1 | Harmony in the Family - Understanding Values in Human Relationships | 1 |
| 3.2 | Family as the basic Unit of Human Interaction | 1 |
| 3.3 | Values in human Relationships | 1 |
| 3.4 | Trust - the foundation value in relationship | 1 |
| 3.5 | Respect as the right evaluation, the Basis for Respect, Assumed Bases for Respect today | 1 |
| 3.6 | Harmony from Family to World Family: Undivided Society | 1 |
| 3.7 | Extending Relationship from family to society , Identification of the Comprehensive Human Goal | 1 |
| 3.8 | Programs needed to achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour | 1 |
| 3.9 | Harmony from Family Order to World Family Order – Universal Human Order | 1 |
| **4** | **HARMONY IN THE NATURE / EXISTENCE** | |
| 4.1 | The Four Orders in Nature | 1 |
| 4.2 | Participation of Human Being in Entire Nature | 1 |
| 4.3 | Natural Characteristics -  Tendency of Human Living with Animal Consciousness / The Holistic Perception of Harmony in Existence | 1 |
| 4.4 | Present day Problems | 1 |
| 4.5 | Recyclability and self-regulation in Nature | 1 |
| 4.6 | Relationship of Mutual Fulfillment | 1 |
| 4.7 | An Introduction to space, Co-existence of Units in Space | 1 |
| 4.8 | Harmony in Existence – Understanding Existence as Co- Existence | 1 |
| 4.9 | Natural Characteristic of Human Living with Human Consciousness | 1 |
| 5 | **IMPLICATIONS OF THE HOLISTIC UNDERSTANDING** | |
| 5.1 | Natural Acceptance of human values | 1 |

| 5.2 | Definitiveness of Ethical Human Conduct - Development of Human Consciousness | 1 |
|------|---|---|
| 5.3 | Identification of Comprehensive Human Goal | 1 |
| 5.4 | Basis for Humanistic Education and Humanistic Constitution | 1 |
| 5.5 | Ensuring Competence in professional Ethics | 1 |
| 5.6 | Issues in Professional Ethics-The Current Scenario | 1 |
| 5.7 | Holistic Technologies and Production Systems and management models - Typical Case Studies | 2 |
| 5.8 | Strategies for transition towards value based life and profession | 1 |
| | **Total** | **45** |

**Course Designers**

1. Dr.G.Vennila  -  vennila@ksrct.ac.in
2. Dr.K.Raja  -  rajak@ksrct.ac.in

| **60 GE 002** | **Tamils and Technology**<br>(Common to all Branches ) | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | GE | 1 | 0 | 0 | 1 |

**Objectives:**

- To learn weaving, ceramic and construction technology of Tamils.
- To understand the agriculture, irrigation and manufacturing technology of Tamils.
- To realize the development of scientific Tamil and Tamil computing.

**Prerequisite:**

Nil

**Course Outcomes:**

On the successful completion of the course, students will be able to
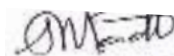
| CO1 | Understand the weaving and ceramic technology of ancient Tamil people nature. | Understand |
|------|---|---|
| CO2 | Comprehend the construction technology, building materials in sangam period and case studies. | Understand |
| CO3 | Infer the metal process, coin and beads manufacturing with relevant archeological evidence. | Understand |
| CO4 | Realize the agriculture methods, irrigation technology and pearl diving. | Understand |
| CO5 | Apply the knowledge of scientific Tamil and Tamil computing. | Apply |

**Mapping with Programme Outcome**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 3 | 3 | 2 | 3 |
| CO2 | | | | | | 3 | 3 | 2 | 3 |
| CO3 | | | | | | 3 | 3 | 2 | 3 |
| CO4 | | | | | | 3 | 3 | 2 | 3 |
| CO5 | | | | | | 3 | 3 | 2 | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | |
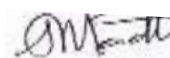
**Syllabus**

| K. S. Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 GE 002 – Tamils and Technology** | | | | | | | | |
| (Common to all Branches) | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| III | 1 | 0 | 0 | 15 | 1 | 100 | - | 100 |
| **WEAVING AND CERAMIC TECHNOLOGY**<br>Weaving Industry during Sangam Age – Ceramic Technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. | | | | | | | | 3 |
| **DESIGN AND CONSTRUCTION TECHNOLOGY**<br>Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period - Type Study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses , Indo – Saracenic architecture at Madras during British Period. | | | | | | | | 3 |
| **MANUFACTURING TECHNOLOGY**<br>Art of Ship Building – Metallurgical studies – Iron Industry – Iron smelting ,Steel  -Copper and gold coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads – Terracotta beads – Shell beads/bone beats – Archeological evidences -Gem stone types described in Silappathikaram. | | | | | | | | 3 |
| **AGRICULTURE AND IRRIGATION TECHNOLOGY**<br>Dam,Tank,Ponds,Sluice,Significance of Kumizhi Thoompu of Chola Period,Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea- Fisheries – Pearl – Conche diving -Ancient Knowledge of Ocean – Knowledge Specific Society. | | | | | | | | 3 |
| **SCIENTIFIC TAMIL & TAMIL COMPUTING**<br>Development of Scientific Tamil – Tamil Computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy- Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project. | | | | | | | | 3 |
| | | | | | | | **Total Hours** | **15** |
| **Text Book(s):** | | | | | | | | |
| 1. | தமிழக வரலாறு -  மக்களும் பண்பாடும் கே. கே . பிள்ளை ( வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). | | | | | | | | |
| 2. | கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). | | | | | | | | |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| 3. | கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
|---|---|
| 4. | பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 5. | Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print). |
| 6. | Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. |
| 7. | Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). |
| 8. | The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) |
| 9. | Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) |
| 10. | Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author). |
| 11. | Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu). |
| 12. | Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book. |

| 60 GE 002 | தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளுக்கும் பொதுவானது) | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | GE | 1 | 0 | 0 | 1 |

**பாடத்தின் நோக்கங்கள்:**

- தமிழர்களின் சங்ககால நெசவு, பனை வனைதல் மற்றும் கட்டிட தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் மற்றும் உற்பத்தி முறைகள் குறித்த கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

**முன்கூட்டிய துறைசார் அறிவு:**

தேவை இல்லை
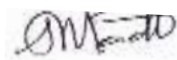
**பாடம் கற்றதின் விளைவுகள்:**

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

| CO1 | சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல் | புரிதல் |
|---|---|---|
| CO2 | சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு. | புரிதல் |
| CO3 | சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு. | புரிதல் |
| CO4 | சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு. | புரிதல் |
| CO5 | நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த | பகுப்பாய்வு |

| | புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும். | |

## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO2 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO3 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO4 | | | | | | | 3 | 3 | | 2 | | 3 |
| CO5 | | | | | | | 3 | 3 | | 2 | | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | |
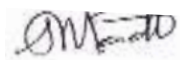
## Syllabus

| K. S. Rangasamy College of Technology – Autonomous (R2022) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60 GE 002 – **தமிழரும் தொழில்நுட்பமும்** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| III | 1 | 0 | 0 | 15 | 1 | 100 | - | 100 |

| **நெசவு மற்றும் பானைத் தொழில்நுட்பம்**:<br>சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள். | 3 |
|---|---|
| **வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**:<br>சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கல் - நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை. | 3 |
| **உற்பத்தித் தொழில் நுட்பம்**:<br>**கப்பல் கட்டும் கலை** – **உலோகவியல்** - **இரும்புத் தொழிற்சாலை** - **இரும்பை உருக்குதல்**, **எஃகு வரலாற்றுச் சான்றுகளாக செம்பு** மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் , கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள். | 3 |
| **வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**:<br>அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்கான வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம். | 3 |
| **அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**<br>அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - | 3 |

| இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம். | |
|---|---|
| **Total Hours** | **15** |

**Text Book(s):**

| | |
|---|---|
| 1. | தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). |
| 2. | கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). |
| 3. | கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 4. | பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு). |
| 5. | Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print). |
| 6. | Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. |
| 7. | Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). |
| 8. | The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) |
| 9. | Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) |
| 10. | Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author). |
| 11. | Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu). |
| 12. | Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book. |

| 60 CS 0P3 | **DATA STRUCTURES LABORATORY** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | CS | 0 | 0 | 4 | 2 |

**Objective**

- To design and implement simple linear and nonlinear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To program for storing data as tree structure and implementation of various traversal techniques
- To implement sorting and searching techniques
- To gain knowledge of graph applications

**Prerequisite**

Basic knowledge of mathematics and programming language in C
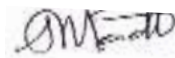
**Course Outcomes**

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

| CO1 | Demonstrate the implementation of Linear Data structures and its applications | Apply |
|---|---|---|
| CO2 | Investigate Balanced Parenthesis and Postfix expressions with the help of Stack ADT | Apply |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| CO3 | Implement Non-Linear Data Structure | Apply |
|---|---|---|
| CO4 | Implement sorting and searching techniques | Apply |
| CO5 | Implement Shortest Path and Minimum Spanning Tree Algorithm | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | | | | | | 2 | | | 2 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 3 | | | | | 3 | | | 2 | 3 | 3 |
| CO3 | 3 | 3 | 2 | 2 | 2 | 2 | | | 3 | 2 | | 2 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 3 | 2 | | | 3 | 2 | 2 | | 2 | 3 | 3 |
| CO5 | 3 | 3 | 2 | | 2 | 2 | 2 | 3 | 3 | 2 | | 2 | 3 | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

**List of Experiments**

1. Implementation of List Abstract Data Type (ADT)
2. Implementation of Stack ADT
3. Implementation of Queue ADT
4. Implementation of stack applications:

   (a) Program for 'Balanced Parenthesis'

   (b) Program for 'Evaluating Postfix Expressions'
5. Implementation Search Tree ADT
6. Implementation of Internal Sorting
7. Develop a program for external sorting
8. Develop a program for various Searching Techniques
9. Implementation of Shortest Path Algorithm
10. Implementation of Minimum Spanning Tree Algorithm

**Course Designers**

1. K.Poongodi                - poongodik@ksrct.ac.in

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| 60 CS 0P4 | JAVA PROGRAMMING LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 4 | 2 |

**Objective**

- To apply core Java concepts to solve real-world problems.
- To implement object-oriented programming (OOP) principles
- To apply exception Handling, Strings, and Collections to manipulate strings and data efficiently.
- To apply the knowledge of Threads and IO streams
- To create a JDBC-integrated mini project that applies a wide range of Java concepts

**Prerequisite**

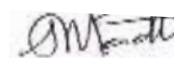Basic knowledge of any programming language with ability to solve logical problems

**Course Outcomes**

On the successful completion of the course, students will be able to
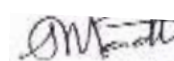
| CO1 | Demonstrate Java fundamentals to solve real world problems | Apply |
|---|---|---|
| CO2 | Design applications involving Object Oriented Programming concepts such as inheritance, polymorphism, abstract classes and interfaces. | Apply |
| CO3 | Implement Java Applications using Strings, Collections and exception Handling. | Apply |
| CO4 | Develop concurrent and input/output-intensive applications using Threads and IO streams | Apply |
| CO5 | Develop a JDBC-integrated mini project to provide extensible software solutions. | Analyze |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | | |
| CO2 | 3 | 3 | 2 | | 3 | | | 2 | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO3 | 2 | 3 | 3 | | 3 | | | 2 | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO4 | 3 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | 2 | |
| CO5 | 2 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | | |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | | |

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1. Implementation of java fundamentals to solve real world problems
2. Demonstrate Class and method, Constructor and Inheritance,
3. Demonstrate Polymorphism, Abstract and Interface
4. Implementation of Exception Handling to check abnormal condition
5. Implementation of String and String Buffer
6. Demonstrate various methods of Collection and Iterator
7. Implementation of multithreading and IO Streams
8. Implementation of Database Connectivity using JDBC

Mini project: Develop an application using the concepts of Inheritance, Polymorphism, Interfaces, Packages, Exception handling and collections along with JDBC.

**Course Designers**

1. Mr.S.Vadivel – vadivels@ksrct.ac.in

| 60 CG 0P2 | **CAREER SKILL DEVELOPMENT II** | Category | L | T | P | Credit |
|-----------|--------------------------------|----------|---|---|---|--------|
|           |                                | CG | 0 | 0 | 2 | 1* |

**Objective**

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

**Prerequisite**

Basic knowledge of reading and writing in English.

**Course Outcomes**

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

| CO1 | Compare and contrast products and ideas in technical texts. | Analyze |
|-----|-------------------------------------------------------------|---------|
| CO2 | Identify cause and effects in events, industrial processes through technical texts | Analyze |
| CO3 | Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format. | Analyze |
| CO4 | Report events and the processes of technical and industrial nature. | Apply |
| CO5 | Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search. | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 |     |     |     |     |     |     |     | 2 | 3 | 3 | 2 | 3 |

| | | | | | | | | 2 | 3 | 3 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| CO3 | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| CO4 | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| CO5 | | | | | | | | 2 | 3 | 3 | 2 | 3 |
| 3- Strong; 2-Medium; 1-Some | | | | | | | | | | | | |

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Career Skill Development II** | | | | | | | | |
| **Common to All Branches** | | | | | | | | |
| Semester | Hours/Week | | | Total Hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| III | 0 | 0 | 2 | 30 | 1* | 100 | 00 | 100 |

| **Listening** | **[5]** |
|---|---|
| Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects, documentaries depicting a technical problem and suggesting solutions - Listening to TED Talks | |
| **Speaking** | **[5]** |
| Marketing a product, persuasive speech techniques - Describing and discussing the reasons of accidents or disasters based on news reports, Group Discussion (based on case studies), presenting oral reports, Mini presentations on select topics with visual aids, participating in role plays, virtual interviews | |
| **Reading** | **[5]** |
| Reading advertisements, user manuals and brochures - longer technical texts– cause and effect essays, and letters / emails of complaint - Case Studies, excerpts from literary texts, news reports etc. - Company profiles, Statement of Purpose (SoPs) | |
| **Writing** | **[5]** |
| Professional emails, Email etiquette - compare and contrast essay - Writing responses to complaints Precis writing, Summarizing and Plagiarism- Job / Internship application – Cover letter & Résumé | |
| **Verbal Ability II** | **[5]** |
| Reading Comprehension (Inferential fillups) – Spotting Errors – Verbal Analogies – Theme Detection – Change of Voice – Change of Speech – One word substitution | |
| **Total Hours** | **25** |

| Reference(s): | |
|---|---|
| 1. | *'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020 |
| 2. | Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020 |
| 3. | Raman. Meenakshi, Sharma. Sangeeta, 'Professional English'. Oxford University Press. New Delhi. 2019 |
| 4. | Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003 |

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|---|---|---|
| **1** | | |
| 1.1 | Evaluative Listening: Advertisements, Product Descriptions | 1 |
| 1.2 | Listening to longer technical talks and completing– gap filling exercises. | 1 |
| 1.3 | Listening technical information from podcasts | 1 |
| 1.4 | Listening to process/event descriptions to identify cause & effects and documentaries depicting a technical problem and suggesting solutions | 1 |
| 1.5 | Listening to TED Talks | 1 |
| **2** | **Speaking** | |
| 2.1 | Marketing a product, persuasive speech techniques | 1 |
| 2.2 | Describing and discussing the reasons of accidents or disasters based on news reports, | 1 |
| 2.3 | Group Discussion (based on case studies) | 1 |
| 2.4 | Presenting oral reports, Mini presentations on select topics with visual aids | 1 |
| 2.5 | participating in role plays and virtual interviews | 1 |
| 3 | **Reading** | |
| 3.1 | Reading advertisements, user manuals and brochures | 1 |
| 3.2 | Reading - longer technical texts– cause and effect essays, and letters / emails of complaint | 1 |
| 3.3 | Case Studies, excerpts from literary texts, news reports etc. | 1 |
| 3.4 | Company profiles | 1 |
| 3.5 | Statement of Purpose (SoPs) | 1 |
| **4** | **Writing** | |
| 4.1 | Professional emails, Email etiquette | 1 |
| 4.2 | Compare and contrast essay | 1 |
| 4.3 | Writing responses to complaints | 1 |
| 4.4 | Precis writing, Summarizing and Plagiarism | 1 |
| 4.5 | Job / Internship application – Cover letter & Résumé | 1 |
| 5 | **Verbal Ability II** | |
| 5.1 | Reading Comprehension (Inferential fillups) and Theme Detection | 1 |
| 5.2 | Spotting Errors | 1 |
| 5.3 | Verbal Analogies | 1 |
| 5.4 | Change of Voice and Change of Speech | 1 |
| 5.5 | One word substitution | 1 |
| | **Total** | **25** |

**Course Designer**

1. Dr.A.Palaniappan      - palaniappan@ksrct.ac.in

| 60 MA 020 | INFERENTIAL STATISTICS AND NUMERICAL METHODS | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | BS | 3 | 1 | 0 | 4 |

### Objective

- To learn the basic concepts of descriptive statistics.
- To familiarize the concepts of correlation and regression.
- To get exposed to various techniques to solve equations numerically.
- To know the concepts of interpolation and numerical integration.
- To learn the basics concepts of initial value problems.

### Prerequisite

Nil

### Course Outcomes

At the end of the course, the students will be able to

| CO1 | Compute measures of central tendency and measures of dispersion. | Remember Understand Apply |
|---|---|---|
| CO2 | Calculate coefficient of correlation and regression. | Remember Understand Apply |
| CO3 | Apply various iteration techniques for solving algebraic, transcendental andsystem of linear equations. | Remember Understand Apply |
| CO4 | Apply different techniques to find the intermediate values and to evaluate singledefinite integrals. | Remember Understand Apply |
| CO5 | Compute the solution for initial value problems using single and multi-step methods. | Remember Understand Apply |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 3 |
| CO2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 3 |
| CO3 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | | 2 |

### AssessmentPattern

| Bloom'sCategory | Continuous Assessment Tests (Marks) | | Model Exam (Marks) | End Sem Examination (Marks) |
|---|---|---|---|---|
| | 1 | 2 | | |
| Remember (Re) | 10 | 10 | 10 | 10 |
| Understand (Un) | 10 | 10 | 20 | 20 |
| Apply (Ap) | 40 | 40 | 70 | 70 |
| Analyze (An) | 0 | 0 | 0 | 0 |
| Evaluate (Ev) | 0 | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 | 0 |
| Total | 60 | 60 | 100 | 100 |

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|---|---|---|---|---|---|---|---|---|
| **60 MA 020 - Inferential Statistics and Numerical Methods** | | | | | | | | |
| **Artificial Intelligence and Machine Learning** | | | | | | | | |
| Semester | Hours/Week | | | Totalhrs | Credit | MaximumMarks | | |
| | L | T | P | | C | CA | ES | Total |
| IV | 3 | 1 | 0 | 60 | 4 | 40 | 60 | 100 |

| | |
|---|---|
| **EmpiricalStatistics** <br> **Measures of central tendency***: Mean, Median and Mode- Measures of dispersion: Range - Quartiledeviation -Standard deviation –Skewness. | **[9]** |
| **Two Dimensional Random Variables** <br> Joint distributions - Marginal and conditional distributions – Covariance – **Correlation*** and Regression - Rank Correlation | **[9]** |
| **Solution of Equations and Eigen Value Problem** <br> Algebraic and Transcendental equations - Newton Raphson method –Method of False position - Gauss elimination method – Gauss Jordan method– Iterative methods: Gauss Jacobi method – GaussSeidel method – Eigen value of a matrix by Power method. | **[9]** |
| **Interpolation and Numerical Integration** <br> **Lagrange's and Newton's divided difference interpolations (unequal intervals)** [**]- **Newton's forward and backward interpolation (equal intervals)** [**]-Two point and three point Gaussian quadrature –Trapezoidal,Simpson's1/3 and 3/8 rule (single integral). | **[9]** |
| **Numerical Solution of Ordinary Differential Equations** <br> Single step methods: Taylor's series method - Euler's method -Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multistep methods: Milne's predictor and corrector method - Adam's predictor and corrector method. | **[9]** |
| **Total Hours: 45 + 15 (Tutorial)** | **60** |

| Textbook(s): | |
|---|---|
| 1. | S.P.Gupta, "Statistical Methods", Sultan Chand & sons, 46thRevised Edition, New Delhi, 2021. |
| 2. | Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015. |

| Reference(s): | |
|---|---|
| 1. | P Kandasamy, K Thilagavathy and K Gunavathi, 'Numerical Methods', S.Chand& Company Ltd, 3rd Edition, 2003. |
| 2. | S.M.Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Academic Press, 2014. |
| 3. | V. K. KapoorandS.C.Gupta , "Fundamentals of Mathematical Statistics ",Publishers: Sultan Chand & sons 12th Edition, New Delhi, 2020. |
| 4. | Faires, J D and Burden R, "Numerical Methods", Thomson publications, Fourth Edition, New Delhi, 2012. |

**\*SDG:4 Quality Education,**
**\*\*SDG:9 Industry, Innovation, and Infrastructure**

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**Course Contents and Lecture Schedule**

| S.No. | Topic | Number of Hours |
|-------|-------|-----------------|
| 1. | **EmpiricalStatistics** | |
| 1.1 | Mean, Median and Mode | 2 |
| 1.2 | Range | 2 |
| 1.3 | Quartile deviation | 1 |
| 1.4 | Tutorial | 2 |
| 1.5 | Standard deviation | 2 |
| 1.6 | Skewness | 1 |
| 1.7 | Tutorial | 2 |
| 2. | **Two Dimensional Random Variables** | |
| 2.1 | Joint distributions | 1 |
| 2.2 | Marginal distributions | 1 |
| 2.3 | Conditional distributions | 1 |
| 2.4 | Covariance | 1 |
| 2.5 | Tutorial | 2 |
| 2.6 | Correlation | 1 |
| 2.7 | Regression | 2 |
| 2.8 | Rank Correlation | 1 |
| 2.9 | Tutorial | 2 |
| 3. | **Solution of Equations and Eigen Value Problem** | |
| 3.1 | Newton-Raphson method | 1 |
| 3.2 | Method of False position | 1 |
| 3.3 | Gaussian elimination method | 1 |
| 3.4 | Gauss-Jordan method | 1 |
| 3.5 | Tutorial | 2 |
| 3.6 | Gauss-Jacobi method | 1 |
| 3.7 | Gauss-Seidel method | 2 |
| 3.8 | Eigen value of a matrix by Power method | 1 |
| 3.9 | Tutorial | 2 |
| 4. | **Interpolation and Numerical Integration** | |
| 4.1 | Lagrange's divided difference interpolation | 2 |
| 4.2 | Newton's divided difference interpolation | 1 |
| 4.3 | Newton's forward and backward interpolations | 2 |
| 4.4 | Tutorial | 2 |
| 4.5 | Two and three point Gaussian quadrature | 1 |
| 4.6 | Trapezoidal and Simpson's 1/3 and 3/8 rules | 2 |
| 4.7 | Tutorial | 2 |
| 5. | **Numerical Solution of Ordinary Differential Equations** | |
| 5.1 | Taylor series method | 2 |
| 5.2 | Euler's method | 1 |

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| 5.3 | Modified Euler's method | 1 |
|------|-------------------------|-----|
| 5.4 | Tutorial | 2 |
| 5.5 | Runge-Kutta method | 2 |
| 5.6 | Milne's predictor and corrector method | 1 |
| 5.7 | Adam's predictor and corrector method | 1 |
| 5.8 | Tutorial | 2 |
| | **Total** | 60 |

### List of MATLAB Programs:

6. Calculate mean, median, mode and range for discrete frequency distribution.

7. Compute the correlation coefficient matrix andSimple Linear Regression.

8. Illustrate Gauss-Jacobi and Gauss-Seidal method for system of linear equations.

9. Demonstrate Trapezoidal and Simpson's rule.

10. Compute the solution of Ordinary Differential Equations using Milne's and Adam's Predictor

and Corrector method.

### CourseDesigners

Ms.V.Thivya- thivya@ksrct.ac.in

| 60 IT 002 | DESIGN AND ANALYSIS OF ALGORITHMS | Category | L | T | P | Credit |
|-----------|-----------------------------------|----------|---|---|---|--------|
| | | PC | 3 | 0 | 0 | 3 |

### Objectives

- To design algorithms in both the science and practice of computing.
- To choose the appropriate data structure and algorithm design method for a specified Application
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To solve NP-hard and NP-complete problems.

### Prerequisite

Basic knowledge of Data Structures and Computer programming

## Course Outcomes

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

| CO1 | Classify the problem types and compare orders of growth to represent asymptotic notations | Understand |
|-----|---|---|
| CO2 | Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms. | Analyze |
| CO3 | Apply 'Brute Force' and 'Divide and conquer' design techniques for sorting and searching problems | Analyze |
| CO4 | Construct analogous algorithms for graph related problems. | Understand |
| CO5 | Apply 'Backtracking' and 'Branch and bound' techniques to solve NP-hard problems. | Apply |

## Mapping with Programme Outcomes

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO1 | 3 | 3 | 3 | 2 | | | | | | 2 | | | 3 | 2 | |
| CO2 | 3 | 3 | 3 | 2 | | | | | | 2 | | | 3 | 2 | |
| CO3 | 3 | 3 | 3 | 2 | 3 | | | | | 2 | | | 3 | 2 | |
| CO4 | 3 | 3 | 3 | 2 | | | | | | 2 | | | 3 | 2 | |
| CO5 | 3 | 3 | 3 | 2 | 3 | | | | | 2 | | | 3 | 2 | |

3-Strong;2-Medium;1-Some

## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | - | - | 10 |
| Understand (Un) | 20 | 20 | 20 |
| Apply (Ap) | 20 | 20 | 30 |
| Analyse (An) | 20 | 20 | 30 |
| Evaluate (Ev) | - | - | 10 |
| Create (Cr) | - | - | - |

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|---|---|---|---|---|---|---|---|---|
| 60 IT 002 - Design and Analysis of Algorithms | | | | | | | | |
| Common to CS, IT, AD | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| IV | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| **Basic Concepts of Algorithms** Introduction - Fundamentals of Algorithmic Problem Solving - Important Problem types - Fundamentals of the analysis of algorithm efficiency - Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Recurrence relations: Methods for solving recurrence relations. | **[9]** |
|---|---|

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| | | |
|---|---|---|
| **Mathematical Analysis of Algorithms**<br>Mathematical Analysis of Non-recursive Algorithms and Examples - Mathematical Analysis of Recursive Algorithms - Example: Fibonacci numbers - Empirical Analysis of Algorithms. | **[9]** | |
| **Brute Force and Divide & Conquer Techniques**<br>Selection Sort and Bubble Sort - Brute-force string matching - Merge sort - Multiplication of Two n-Bit Numbers - Quick Sort - Binary Search - Binary tree Traversal and Related Properties. | **[9]** | |
| **Algorithm Design Paradigm**<br>Decrease and Conquer Technique: Insertion Sort - Depth first Search and Breadth First Search – Transform and Conquer Technique: Presorting - Dynamic Programming: Computing a Binomial Coefficient - Warshall's and Floyd's Algorithm - The Knapsack Problem and Memory Functions - Optimal Binary Search trees – Greedy Technique: Huffman trees. | **[9]** | |
| **NP Hard and NP-Complete Problems**<br>P and NP problems - NP complete problems - Backtracking: N-Queen's Problem - Hamiltonian Circuit Problem Branch and Bound Techniques: Traveling salesman problem. | **[9]** | |
| Total Hours | **45** | |

**Textbook(s):**

| | |
|---|---|
| 1. | AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", 3rd Edition, Tenth Impression, Pearson Education Asia, 2017. |
| 2. | T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", 3rd Edition, PHI Pvt. Ltd., 2012. |

**Reference(s):**

| | |
|---|---|
| 1. | Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2010. |
| 2. | A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003. |
| 3. | Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms/ C++", 2nd Edition, Universities Press, 2007. |
| 4. | Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 2nd Edition, Pearson Education, 2011. |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No. of Hours |
|---|---|---|
| **1.0** | **Basic Concepts of Algorithms** | |
| 1.1 | Fundamentals of Algorithmic Problem Solving | 1 |
| 1.2 | Important Problem types | 1 |
| 1.3 | Fundamentals of the analysis of algorithm efficiency | 1 |
| 1.4 | Analysis Framework | 1 |
| 1.5 | Asymptotic Notations | 1 |
| 1.6 | Asymptotic Notations and Basic Efficiency Classes | 1 |
| 1.7 | Recurrence relations | 1 |
| 1.8 | Methods for solving recurrence relations. | 2 |
| **2.0** | **Mathematical Analysis of Algorithms** | |
| 2.1 | Mathematical Analysis of Non-recursive Algorithms | 2 |
| 2.2 | Non-recursive Algorithms and Examples | 2 |
| 2.3 | Mathematical Analysis of Recursive Algorithms | 2 |
| 2.4 | Fibonacci numbers | 1 |
| 2.5 | Empirical Analysis of Algorithms. | 2 |

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| 3.0 | **Brute Force and Divide & Conquer Techniques** | |
|------|--------------------------------------------------|---|
| 3.1 | Selection Sort | 1 |
| 3.2 | Bubble Sort | 1 |
| 3.3 | Brute-force string matching | 1 |
| 3.4 | Merge sort | 1 |
| 3.5 | Multiplication of Two n-Bit Numbers | 1 |
| 3.6 | Quick Sort | 1 |
| 3.7 | Binary Search | 1 |
| 3.8 | Binary tree Traversal | 2 |
| **4.0** | **Algorithm Design Paradigm** | |
| 4.1 | Decrease and Conquer Technique: Insertion Sort | 1 |
| 4.2 | Depth first Search and Breadth First Search | 1 |
| 4.3 | Transform and Conquer Technique: Presorting | 1 |
| 4.4 | Dynamic Programming: Computing a Binomial Coefficient | 1 |
| 4.5 | Warshall's and Floyd's Algorithm | 1 |
| 4.6 | The Knapsack Problem and Memory Functions | 1 |
| 4.7 | Optimal Binary Search trees | 1 |
| 4.8 | Greedy Technique: Huffman trees. | 2 |
| **5.0** | **NP Hard and NP-Complete Problems** | |
| 5.1 | P and NP problems | 1 |
| 5.2 | NP complete problems | 1 |
| 5.3 | Backtracking: N-Queen's Problem | 2 |
| 5.4 | Hamiltonian Circuit  Problem | 2 |
| 5.5 | Branch and Bound Techniques | 1 |
| 5.6 | Traveling salesman problem. | 2 |
| | **Total** | **45** |

**Course Designers**

1.Dr.C.Rajan- rajan@ksrct.ac.in

| | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **60 AM 401** | **ARTIFICIAL INTELLIGENCE** | PC | 3 | 0 | 0 | 3 |

**Objective**
- To learn the basic concepts and techniques of Artificial Intelligence.
- To develop AI algorithms for solving practical problems.
- Interpret the knowledge and reasoning in propositional logic and first order logic.
- Learn to represent uncertain knowledge in solving AI problems and ML and deep learning algorithms and models.
- Understand the different forms of learning and NLP,computer vision.

**Prerequisite**
Basic Knowledge of Computer Programming and Algorithms

**CourseOutcomes**

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

| CO1 | Understand the basic concepts and techniques of Artificial Intelligence | Remember, Understand, Analyze |
|---|---|---|
| CO2 | Apply AI algorithms for solving practical problems | Remember, Apply, Analyze |
| CO3 | Describe human intelligence and AI | Remember, Understand, Apply Analyze |
| CO4 | Explain how intelligent system works and ML and deep learning algorithms and models. | Remember, Understand, Apply |
| CO5 | Apply basics of Fuzzy logic and neural networks, AI applications,NLP,Computer vision. | Remember, Apply |

**MappingwithProgrammeOutcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| CO2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| CO3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| CO5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

**AssessmentPattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination(Marks) |
|---|---|---|---|---|
| | **1** | **2** | **3** | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 20 | 20 | 20 | 40 |
| Analyse | 10 | 10 | 10 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **K.S.Rangasamy College of Technology–AutonomousR2022** | | | | | | | |
| **60 AM 401-Artificial Intelligence** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Totalhrs | Credit | MaximumMarks | | |
| | L | T | P | | C | C | E | Total |
| IV | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction**
Artificial Intelligence and its applications, Artificial Intelligence Techniques, Level of models, criteria of success, Intelligent Agents, Nature of Agents, Learning Agents. AI Techniques, advantages, and limitations of AI, Impact and Examples of AI, Application domains of AI. The AI Ladder - The Journey for Adopting AI Successfully, Advice for a career in AI, **Hotbeds of AI Innovation\*.**  [9]

**Problem solving techniques**
State space search, control strategies, heuristic search, problem characteristics, production system characteristics., Generate and test, Hill climbing, best first search, A\* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening.  [9]

**Logic**
Propositional logic, predicate logic, Resolution, Resolution in proportional logic and predicate logic, Clause form, unification algorithm,  [9]

**Knowledge Representation schemes and reasoning**
Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Non-monotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures, semantic nets, frame, conceptual dependency, scripts-Introduction to AI and ML-**Machine learning fundamentals-Deep learning\***  [9]

**Planning**
The Planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, Analysis of planning approaches, Hierarchical planning, conditional planning, Continuous and Multi Agent planning. **Real-world applications:NLP and Computer Vision\***  [9]

| | |
|---|---|
| **TotalHours** | 45 |

**Text Book(s):**

| | |
|---|---|
| 1. | S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Education, 2018. |
| 2. | Melanie Mitchell," Artificial Intelligence: A Guide for Thinking Humans", Farrar, Straus and Giroux Publisher,2019 |

**Reference(s):**

| | |
|---|---|
| 1. | Dan W. Patterson, "Introduction to AI and ES", Third Edition, Pearson Education, 2017. |
| 2. | Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2019. |
| 3. | Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/ |
| 4. | Stuart Russell," Human Compatible – Artificial Intelligence and the Problem of Control",Viking publisher,2019 |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| S.No | Topic | No.of Hours |
|---|---|---|
| | | |

| S.No | Topic | No.of Hours |
|---|---|---|
| 5. | Carl Dennis,"Machine Learning And Artificial Intelligence: A Comprehensive Guide to Understanding and Implementing ML and AI (2023 Beginner Crash Course)",Carl Dennis 2023 | |

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | Artificial Intelligence and its applications | 1 |
| 1.2 | Artificial Intelligence Techniques | 1 |
| 1.3 | Level of models, criteria of success | 1 |
| 1.4 | Intelligent Agents, Nature of Agents | 1 |
| 1.5 | Learning Agents | 1 |
| 1.6 | AI Techniques, advantages, and limitations of AI | 2 |
| 1.7 | Impact and Examples of AI, Application domains of AI | 1 |
| 1.8 | The AI Ladder | 1 |
| 1.9 | The Journey for Adopting AI Successfully | 1 |
| 1.10 | Advice for a career in AI | 1 |
| 1.11 | Hotbeds of AI Innovation | 1 |
| **2** | **Problem solving techniques** | |
| 2.1 | State space search, control strategies | 1 |
| 2.2 | heuristic search, problem characteristics | 1 |
| 2.3 | production system characteristics. | 1 |
| 2.4 | Generate and test, Hill climbing | 1 |
| 2.5 | best first search, A* search | 1 |
| 2.6 | Constraint satisfaction problem, | 1 |
| 2.7 | Mean-end analysis | 1 |
| 2.8 | Min-Max Search | 1 |
| 2.9 | Alpha-Beta Pruning, Additional refinements, Iterative Deepening | 2 |
| **3** | **Logic** | |
| 3.1 | Propositional logic | 1 |
| 3.2 | predicate logic | 1 |
| 3.3 | Resolution | 1 |
| 3.4 | Resolution in proportional logic and predicate logic | 1 |
| 3.5 | Clause form, unification algorithm | 1 |
| **4** | **Knowledge Representation schemes and reasoning** | |
| 4.1 | Mapping between facts and representations, Approaches to knowledge representation | 1 |
| 4.2 | procedural vs declarative knowledge, Forward vs. Backward reasoning | 1 |
| 4.3 | Matching, conflict resolution | 1 |
| 4.4 | Non-monotonic reasoning | 1 |
| 4.5 | Default reasoning, statistical reasoning | 1 |
| 4.6 | fuzzy logic Weak and Strong filler structures | 1 |

| 4.7 | semantic nets, frame | 1 |
|------|----------------------------------------------------------|-----|
| 4.8 | conceptual dependency, scripts | 1 |
| 4.9. | Introduction to AI and ML-Machine learning fundamentals | 1 |
| 4.10. | Deep learning | 1 |
| **5** | **Planning** | |
| 5.1 | The Planning problem | |
| 5.2 | planning with state space search | 1 |
| 5.3 | partial order planning | 1 |
| 5.4 | planning graphs | 1 |
| 5.5 | planning with propositional logic | 1 |
| 5.6 | Analysis of planning approaches | 1 |
| 5.7 | Hierarchical planning | 1 |
| 5.8 | conditional planning | 1 |
| 5.9 | Continuous and Multi Agent planning | 1 |
| 5.10. | NLP and Computer Vision | 1 |
| | **Total** | **45** |

## Course Designers

R.Vijaysai – vijaysair@ksrct.ac.in

| 60 AM 402 | SOFTWARE ENGINEERING | Category | L | T | P | Credit |
|-----------|---------------------|----------|---|---|---|--------|
| | | PC | 2 | 0 | 2 | 3 |

### Objective

- To understand the phases and process in a software Development
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures
- To learn various project metrics and risk management

### Prerequisite

NIL

### Course Outcomes

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

| CO1 | Analyze the key activities in managing a software process and project | Analyze |
|-----|--------------------------------------------------------------------|---------|
| CO2 | Analyze the concepts of requirements engineering and Modeling. | Analyze |
| CO3 | Apply systematic procedure for software design and deployment. | Apply |
| CO4 | Compare and contrast the various testing and maintenance. | Analyze |
| CO5 | Manage project schedule, estimate project cost and Identify Risk | Analyze |

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 2 | 3 | | | | | | 3 | 3 | | 3 | |
| CO2 | 3 | 3 | 3 | | | | | | 2 | 2 | 3 | | 3 | |
| CO3 | 3 | 3 | 3 | | | | | | | | 3 | | 3 | |
| CO4 | 3 | 3 | 3 | 2 | 3 | | | | | | 3 | | 3 | |
| CO5 | 3 | 3 | 3 | 3 | 3 | | 2 | 2 | 3 | 2 | 3 | 3 | 3 | |

3- Strong;2-Medium;1-Some

**AssessmenPattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination (Marks) |
|------------------|------|------|------|------|
| | 1 | 2 | 3 | |
| Remember | 10 | 10 | 20 | 10 |
| Understand | 10 | 10 | 20 | 10 |
| Apply | 20 | 20 | 30 | 20 |
| Analyse | 20 | 20 | 30 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| K.S.Rangasamy College of Technology–AutonomousR2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 60 AM 402 – Software Engineering | | | | | | | |
| AIML | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | |
| | L | T | P | | C | C | ES | Total |
| IV | 2 | 0 | 2 | 45 | 3 | 50 | 50 | |
| **Software Process and Agile Development**<br>Introduction to Software Engineering, Software Development Lifecycle Software Process, Perspective and Specialized Process Models–Introduction to Agility-Agile process-Extreme programming-XP Process. | | | | | | | 8 |

| | | |
|---|---|---|
| **Requirements Analysis and Specification**<br>Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document –Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary. | | **9** |
| **Software Design**<br>Design process–Design Concepts-Design Model–Design Heuristic–Architectural Design-Architectural styles, Architectural Design, Architectural Mapping using Data Flow-User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components | | **8** |
| **Testing and Maintenance**<br>Software testing fundamentals-Internal and external views of Testing-white box testing-basis path testing- control structure testing-black box testing-Regression Testing–Unit Testing –Integration Testing–Validation Testing–System Testing And Debugging–Software Implementation Techniques: Coding practices- Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering. | | **9** |
| **Project Management***<br>Software Project Management: Estimation–LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model–Project Scheduling–Scheduling, Earned Value Analysis Planning–Project Plan, Planning Process, RFP Risk Management–Identification, Projection-Risk Management-Risk Identification-RMMM Plan-CASE Tools.<br>**Laboratory/Exercises:***<br>1. Prepare a SRS document in line with the IEEE recommended standards.<br>2. Draw the Entity relationship diagram of a project.<br>3. Draw the data flow diagrams at level 0 and level 1.<br>4. Draw use case diagram and activity diagram in starUML<br>5. Draw class diagram and component diagram in starUML.<br>6. Draw sequence diagram and collaboration diagram in starUML.<br>7. Develop a Project with all software engineering concepts. | | 11 |
| | **Total Hours** | 45 |

| | Text Book(s): | |
|---|---|---|
| 1. | Roger S. Pressman, Software Engineering – A Practitioner's Approach, Seventh Edition, Mc Graw-Hill International Edition, 2017. | |
| 2. | Ian Sommerville, Software Engineering, 9th Edition, Pearson Education Asia, 2015. | |

| | Reference(s): | |
|---|---|---|
| 1. | Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India, 2016. | |
| 2. | Rajib Mall, Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2016. | |
| 3. | Kelkar S.A., Software Engineering, Prentice Hall of India Pvt Ltd, 2015. | |
| 4. | Stephen R.Schach, Software Engineering, Tata McGraw-Hill Publishing Company Limited, 2017. | |

***SDG:4- Quality Education**

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|------|-------|-------------|
| 1 | **Software Process and Agile Development** | |
| 1.1 | Introduction to Software Engineering | 1 |
| 1.2 | Software Development Lifecycle | 1 |
| 1.3 | Software Process, Perspective | 1 |
| 1.4 | Specialized Process Models | 1 |
| 1.5 | Specialized Process Models | 1 |
| 1.6 | Introduction to Agility-Agile process | 1 |
| 1.7 | Extreme programming | 1 |
| 1.8 | XP Process | 1 |
| 2 | **Requirements Analysis and Specification** | |
| 2.1 | Functional and Non-Functional, User requirements | 1 |
| 2.2 | System requirements, Software Requirements Document | 1 |
| 2.3 | Software Requirements Document | 1 |
| 2.4 | Requirement Engineering Process: Feasibility Studies | 1 |
| 2.5 | Requirements elicitation and analysis | 1 |
| 2.6 | Requirements elicitation and analysis | 1 |
| 2.7 | Requirements validation | 1 |
| 2.8 | requirements management | 1 |
| 2.9 | Classical analysis: Structured system | 1 |
| 3 | **Software Design** | |
| 3.1 | Design process and Concepts. | 1 |
| 3.2 | Design Model and Design Heuristic | 1 |
| 3.3 | Architectural Design and Architectural styles | 1 |
| 3.4 | Architectural Mapping using Data Flow | 1 |
| 3.5 | User Interface Design | 1 |
| 3.6 | Interface analysis | 1 |
| 3.7 | Component level Design: Designing Class based components | 1 |
| 3.8 | traditional Components | 1 |
| 4 | **Testing and Maintenance** | |
| 4.1 | Software testing fundamentals-Internal and external views of Testing | 1 |
| 4.2 | White box testing-basis path testing | 1 |
| 4.3 | White box testing- control structure testing | 1 |
| 4.4 | Black box testing-Regression Testing, Unit Testing , Integration Testing | 1 |
| 4.5 | Black box testing–Validation Testing, System Testing | 1 |
| 4.6 | Debugging, Software Implementation Techniques | 1 |
| 4.7 | Coding practices, Refactoring-Maintenance and Reengineering | 1 |
| 4.8 | BPR model, Reengineering process model | 1 |
| 4.9 | Reverse and Forward Engineering. | 1 |
| 5 | **Project Management** | |
| 5.1 | Estimation–LOC, FP Based Estimation | 1 |
| 5.2 | Make/Buy Decision COCOMO I & II Model | 1 |
| 5.3 | Make/Buy Decision COCOMO I & II Model | 1 |

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| 5.4 | Scheduling and Earned Value Analysis Planning | 1 |
|------|-----------------------------------------------|---|
| 5.5 | Project Plan and Planning Process | 1 |
| 5.6 | Project Plan and Planning Process | 1 |
| 5.7 | RFP Risk Management–Identification | 1 |
| 5.8 | Projection-Risk Management | 1 |
| 5.9 | Risk Identification | 1 |
| 5.10 | RMMM Plan | 1 |
| 5.11 | CASE Tools | 1 |

## Course Designers

1. **Dr.B.G.GEETHA-** geetha@ksrct.ac.in

| 60 AM 403 | DATABASE MANAGEMENT SYSTEMS | Category | L | T | P | Credit |
|-----------|------------------------------|----------|---|---|---|--------|
| | | PC | 3 | 0 | 0 | 3 |

### Objective

- To familiarize the students with various data models and query language.
- Gain knowledge on data storage and indexing concepts.
- To expose the fundamental softransaction processing and recovery concepts.
- To make the students aware of the various current trends in database system.
- To know the current trends of various databases

### Prerequisite

Basic Knowledge of Data Storage and Management

### CourseOutcomes

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

| CO1 | Express the knowledge of database systems and analyze the various data models | Analyze |
|-----|-------------------------------------------------------------------------------|---------|
| CO2 | Employ the concept of Data Definition Language and Data Manipulation Language and apply the various Normal Forms in database design | Apply |
| CO3 | Express the knowledge of secondary storage device and the concepts of hashing, BTree, B+Tree in indexing to retrieve the data | Apply |
| CO4 | Apply the various concurrency control techniques in database transactions and recovery techniques | Analyze |
| CO5 | Classify the recent databases such and Express the knowledge of data ware housing and data mining | Analyze |

### Mapping with Programme Outcomes

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO | PO | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|------|------|------|

| | | | | | | | | | | 10 | 11 | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | 2 | | 2 |
| CO2 | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | 2 | 3 | 3 |
| CO3 | 3 | 3 | 2 | | 2 | | | | | | | | 2 | 3 |
| CO4 | 3 | 3 | 2 | | 2 | 2 | 2 | | 3 | | | | | 3 |
| CO5 | 3 | 3 | 2 | | 2 | 2 | 2 | | | | | | | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

**Assessment Pattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination(Marks) |
|------------------|------|------|------|-----------------------------------|
| | 1 | 2 | 3 | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 20 | 20 | 20 | 40 |
| Analyse | 10 | 10 | 10 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 403-Database Management Systems** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | |
| | L | T | P | | C | C | ES | Total |
| IV | 3 | 0 | 0 | 45 | 3 | 40 | 60 | |

| | |
|---|---|
| **Introduction and Conceptual Modeling** Introduction Database systems – DBMS Applications – Purpose of DBMS – Views of Data - Database System Architecture–Data Storage and Querying– DB Users and Administrators –Data Models–ER model–Relational Model – Relational Algebra and Calculus. | [9] |
| **Relational Model** Introduction to SQL–IntermediateSQL–AdvancedSQL–Triggers–Functions and Procedures–Embedded SQL-Normalization for Relational Databases (upto5NF). | [9] |
| **Data Storage and Indexing Concepts** Record storage and Primary file organization –RAID – Operations on Files- Heap File-Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes-B-Tree - B+Tree. | [9] |
| **Transaction Management** Transaction – Transaction Concepts- Transaction Model-Desirable properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control – Types of Locks- Two Phase locking-Time stamp based concurrency control –Recovery Techniques–Concepts-Immediate Update-Deferred Update. | [9] |

| | | [9] |
|---|---|---|
| **Current Trends Object Oriented Databases –Distributed databases-Homogenous and Heterogeneous-DistributeddataStorage–DistributedTransaction–CommitProtocols-DataMining–DataMiningApplications–Data Warehousing*** | | |
| | **Total Hours** | 45 |

**Text Book(s):**

| 1. | Abraham Silberschatz ,Henry F.Korth and S.Sudarshan -"Database System Concepts", sixth Edition ,McGraw-Hill, 2011. |
|---|---|
| 2. | RamezElmasriandShamkantB.Navathe,"FundamentalDatabaseSystems",FifthEdition,PearsonEducation, 2009. |

**Reference(s):**

| 1. | Raghu Ramakrishnan,"DatabaseManagementSystem",TataMcGraw-Hill Publishing Company,2003. |
|---|---|
| 2. | Hector Garcia–Molina,JeffreyD.Ullman and Jennifer Widom-"Database System Implementation"-Pearson Education- 2003. |
| 3. | Peter Roband Corlos Coronel Database System,Design,Implementation and Management",ThompsonLearning Course Technology- Fifth edition, 2003. |
| 4. | RajivChopra,"Database Management System a Practical Approach",S.Chand & co |

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction and Conceptual Modeling** | |
| 1.1 | Introduction to database | 1 |
| 1.2 | Applications of DBMS. | 1 |
| 1.3 | Different  Views of Data | 1 |
| 1.4 | Database System Architecture | 1 |
| 1.5 | Database Administrator | 1 |
| 1.6 | Entity Relationship Model | 2 |
| 1.7 | Relational Model | 1 |
| 1.8 | Tuple and Domain Relational Calculus | 1 |
| 1.9 | E-R Diagram Banking application | 1 |
| 1.10 | Hierarchical Model | 1 |
| 1.11 | Network Model | 1 |
| **2** | **Relational Model** | |
| 2.1 | Structure Query Language introduction | 1 |
| 2.2 | Data Definition Language | 1 |
| 2.3 | Data Manipulation Language – Select with where and order by | 1 |
| 2.4 | Select using aggregate function | 1 |
| 2.5 | Select using group by and having clause | 1 |
| 2.6 | Sub query and Views | 1 |
| 2.7 | Triggers | 1 |

| | | |
|---|---|---|
| 2.8 | Function and Procedures | 1 |
| 2.9 | Normalization | 2 |
| **3** | **Data Storage and Indexing Concepts** | |
| 3.1 | Fixed and Variable length record structure | 1 |
| 3.2 | File Organization | 1 |
| 3.3 | RAID | 1 |
| 3.4 | Static and Dynamic Hashing | 1 |
| 3.5 | Indexing- Single, Multilevel and Mutable | 1 |
| 3.6 | Dense and Sparse Index | 1 |
| 3.7 | B and B+ Tree Index | 1 |
| 3.8 | Heap Organization | 1 |
| **4** | **Transaction Management** | |
| 4.1 | Transaction Concept and ACID properties | 1 |
| 4.2 | Transaction States and schedule | 1 |
| 4.3 | Conflict and View serializable schedule | 1 |
| 4.4 | Recoverability | 1 |
| 4.5 | Concurrency Control introduction- Share Lock, Exclusive Lock, Compatibility matrix, upgrade and downgrade | 1 |
| 4.6 | Two-Phase and Time stamp based locking protocol | 1 |
| 4.7 | Recovery Technique – Immediate Update | 1 |
| 4.8 | Recovery Technique – Deferred Update | 1 |
| **5** | **Current Trends** | |
| 5.1 | Object Oriented Database | 2 |
| 5.2 | Distributed Database Concept and Types | 1 |
| 5.3 | Distributed Transaction – Two-Phase Commit Protocol | 1 |
| 5.4 | Distributed Transaction – Three-Phase Commit Protocol | 1 |
| 5.5 | Distributed Data Storage | 1 |
| 5.6 | Data Mining Concept and Applications | 1 |
| 5.7 | Classification Algorithms | 2 |
| 5.8 | Clustering Algorithms | 1 |
| 5.9 | Data Warehouse Concept and Preprocessing | 1 |
| 5.10 | Data Warehouse Schema Models | 1 |
| 5.11 | Designing three dimensional OLAP Cube with its operations | 1 |
| | **Total** | **50** |

## Course Designers
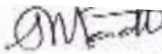
1. Dr A GNANABASKARAN- gnanabaskarana@ksrct.ac.in

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Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60 MY 003 – Start-ups and Entrepreneurship | | | | | | | | |
| Common to all Branches | | | | | | | | |
| **Semester** | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| IV | 2 | 0 | 0 | 30 | - | 100 | - | 100 |
| **Objective(s)** | <ul><li>To provides practical proven tools for transforming an idea into a product or service that createsvalue for others.</li><li>To build a winning strategy, how to shape a unique value proposition, prepare a business plan</li><li>To impart practical knowledge on business opportunities</li><li>To inculcate the habit of becoming entrepreneur</li><li>To know the financing, growth and new venture & its problems</li></ul> | | | | | | | |
| **Course Outcome** | **At the end of the course, the student will be able to**<br>CO1: Transform ideas into real products, services and processes, by validating the idea, testing it, and turning it into a growing, profitable and sustainable business.<br>CO2: Identify the major steps and requirements in order to estimate the potential of an innovative idea as the basis of an innovative project.<br>CO3: Reach creative solutions via an iteration of a virtually endless stream of world-changingideas and strategies, integrating feedback, and learning from failures along the way.<br>CO4: Apply the 10 entrepreneurial tools in creating a business plan for a new innovative venture.<br> CO5: Apply methods and strategies learned from interviews with startup entrepreneurs and innovators. | | | | | | | |
| **Note:**The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required.  The marks allotted for questions in the examinations shall not depend on the number of hours indicated. | | | | | | | | |

| **Introduction to Entrepreneurship & Entrepreneur** | |
|---|---|
| Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship.<br>The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system. | [6] |
| **Business Opportunity Identification and Preparing a Business Plan** | |
| Business ideas, methods of generating ideas, and opportunity recognition, Idea Generation Process, Feasibility study, preparing a Business Plan: Meaning and significance of a business plan, components of a business plan. | [6] |
| **Innovations** | |
| Innovation and Creativity - Introduction, Innovation in Current. Environment, Types of Innovation, School of Innovation, Analysing the Current Business Scenario, Challenges of Innovation, Steps of Innovation Management, Experimentation in Innovation Management, Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation. Blue Ocean Strategy-I, Blue Ocean Strategy-II. Marketing of Innovation, Technology Innovation Process | [6] |
| **Financing & Launching the New Venture** | |
| Importance of new venture financing, types of ownership, venture capital, types of debt securities,determining ideal debt-equity mix, and financial institutions and banks.<br>Launching the New Venture: Choosing the legal form of new venture, protection of intellectual property, andformation of the new venture | [6] |
| **Managing Growth & Rewards in New Venture** | |
| Characteristics of high growth new ventures, strategies for growth, and building the new ventures.<br>Managing Rewards: Exit strategies for Entrepreneurs, Mergers and Acquisition, Succession and exitstrategy, managing failures – bankruptcy | [6] |
| **Total Hours** | 30 |

| Text book(s): | |
|---|---|
| 1. | Stephen Key, "One Idea for Startups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company" 1 Edition, Tata McGrawhill Company, New Delhi, 2013. |
| 2. | Charles Bamford and Garry Bruton, "ENTREPRENEURSHIP: The Art, Science, and Process for Success", 2 Edition, Tata McGrawhill Company, New Delhi, 2016. |

| Reference(s) : | |
|---|---|
| 1 | Philip Auerswald, "The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy",Oxford University Press, 2012. |
| 2 | Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, "Entrepreneurial Finance: Strategy, Valuation, andDeal Structure, Stanford Economics and Finance", 2011 |
| 3 | Edward D. Hess, "Growing an Entrepreneurial Business: Concepts and Cases", Stanford Business Books, 2011 |
| 4 | Howard Love, "The Start-Up J Curve: The Six Steps to Entrepreneurial Success", Book Group Press, 2011 |

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | | 2 | 2 | | |
| 2 | 2 | 3 | 3 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | | |
| 3 | 3 | 2 | 3 | 1 | 2 | | | | 1 | 3 | 1 | 3 | | |
| 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | | 1 | 3 | 3 | | |
| 5 | 3 | 2 | 3 | 3 | 3 | | | 2 | | | 3 | 2 | | |

| 60 AM 4P1 | ARTIFICIAL INTELLIEGNCE LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 2 | 4 |

## Objective

- To learn the basic concepts and techniques of Artificial Intelligence.
- To develop AI algorithms for solving practical problems.

## Prerequisite

Basic knowledge of Computer Programming and Algorithms

## CourseOutcomes

Onthesuccessful completion ofthecourse,students will beable to
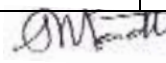
| CO1 | Understand the basic concepts and techniques of Artificial Intelligence interaction | Apply |
|---|---|---|
| CO2 | Apply AI algorithms for solving practical problems | Apply |
| CO3 | Describe human intelligence and AI | Apply |
| CO4 | Explain how intelligent system works | Apply |
| CO5 | Apply basics of Fuzzy logic and neural networks | Apply |

## MappingwithProgrammeOutcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 | 2 | | |
| CO2 | 3 | 3 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 | 2 | | 3 |
| CO3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | 3 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | | 3 |
| CO5 | 3 | 3 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 | 3 | | 2 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23                    BoS Chairman
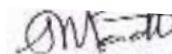
| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 4P1– Artificial Intelliegnce Laboratory** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| IV | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Study of PROLOG Programming language and its Functions. Write Simple facts for the statements using PROLOG
2. Implementation of Depth First Search for Water Jug problem.
3. Implementation of Breadth First Search for Tic-Tac-Toe problem.
4. Solve 8-puzzle problem using Best First Search.
5. Write PROLOG program to solve N-Queens problem.
6. Implementation of traveling Salesman Problem.
7. Implementation of Tower of Hanoi Problem
8. Implementation of Monkey Banana Problem.
9. Solve N-Queens Problem.
10. Implementation of Missionaries-Cannibals Problem.

**CourseDesigners**

1.R.Vijay Sai – vijaysair@ksrct.ac.in

| 60 AM 4P2 | DATABASE MANAGEMENT SYSTEMS LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 4 | 2 |

## Objective

- To present SQL and procedural interfaces to SQL comprehensively
- To perform various commands in RDBMS
- To Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers
- To design the applications like payroll
- To apply procedures and functions in PL/SQL

## Prerequisite

Basic Knowledge of Data Storage and Management

## Course Outcomes

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

| CO1 | Implement the Data Definition Language, Data Manipulation Language and Data Control Language commands in RDBMS | Apply |
|---|---|---|
| CO2 | Employ the Sub queries to retrieve data from multiple tables | Apply |
| CO3 | Implement the High-level language extension with Cursors and Triggers | Apply |
| CO4 | Implement the Procedures and Functions in PL/SQL | Apply |
| CO5 | Demonstrate the views, joins and Embedded SQL In RDBMS | Apply |

### Mapping with Programme Outcomes
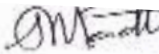
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 | 2 | 2 |
| CO2 | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 | 2 | 2 |
| CO3 | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 | 2 | 2 |
| CO4 | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | | 3 | 2 | 2 | | 3 | 3 | | 2 | 2 | 2 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

Passed in BoS Meeting held on 02/12/23

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BoS Chairman

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 4P2– Database Management Systems Laboratory** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| IV | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Data Definition Language (DDL) commands in RDBMS.

2. Data Manipulation Language (DML), Data Control Language (DCL)and Transaction Control Language (TCL) commands in RDBMS.

3. Implementation of Sub queries.

4. Creation of views and joins.

5. High-level language extension with Cursors.

6. High level language extension with Triggers

7. Procedures and Functions.

8. Embedded SQL.

9. Design and implementation of Payroll Processing System.

10. Design and implementation of Banking System.

11. Design and implementation of Railway Reservation System

## Course Designers

1.Dr A Gnanabaskaran - gnanabaskarana@ksrct.ac.in

| | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **60 CG 0P3** | **CAREER SKILL DEVELOPMENT III** | CG | 0 | 0 | 2 | 1* |

### Objective

- To help learners improve their logical reasoning skills at different academic and professionalcontexts.
- To help learners relate basic quantitative problems and solve them.
- To help learners Infer critically the statements with optimal conclusions and assumptions.
- To Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, andprofit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest
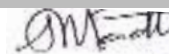
### Prerequisite

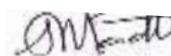Basic knowledge of Arithmetic and Logical Reasoning

### Course Outcomes

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

| CO1 | Deduce the topics in logical reasoning at the preliminary and intermediate level. | Analyze |
|---|---|---|
| CO2 | Relate basic quantitative problems and solve them effectively at the preliminary level | Apply |
| CO3 | Infer critically the statements with optimal conclusions and assumptions with the data and information given. | Analyze |
| CO4 | Solve the quantitative problems pertaining to calculations of averages,ratio and proportions, and profit and loss effectively at the pre-intermediate level. | Apply |
| CO5 | Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level. | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 3 | | 3 | | | | 2 | 3 | 3 | | |
| CO2 | 3 | 3 | 3 | 3 | | 2 | | | | 2 | 3 | 3 | | |
| CO3 | 2 | 2 | 2 | 2 | | 3 | | | | 2 | 3 | 3 | | 2 |
| CO4 | 3 | 3 | 3 | 3 | | 2 | | | | 2 | 3 | 3 | 2 | |
| CO5 | 3 | 3 | 3 | 3 | | 2 | | | | 2 | 3 | 3 | 2 | 2 |
| 3- Strong; 2-Medium; 1-Some | | | | | | | | | | | | | | |
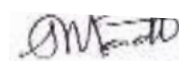
## K.S.Rangasamy College of Technology – Autonomous R2022
### Career Skill Development III
### Common to All Branches

| Semester | Hours/Week | | | Total Hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| IV | 0 | 0 | 2 | 30 | 1* | 100 | 00 | 100 |

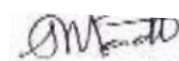| | |
|---|---|
| **Logical Reasoning**<br>Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Blood Relations - Coded Relations - Order and Ranking – odd man out - Direction and distance | **[5]** |
| **Quantitative Aptitude – Part 1**<br>Number system - Squares & cubes - Divisibility - Unit digits - Remainder Theorem - HCF& LCM - Geometric and Arithmetic progression - Surds & indices | **[5]** |
| **Critical Reasoning**<br>Syllogism - Statements and Conclusions, Cause and Effect, Statements and Assumptions - identifying Strong Arguments and Weak Arguments – Cause and Action -Data sufficiency | **[5]** |
| **Quantitative Aptitude – Part 2**<br>Average - Ratio and proportion – Ages – Partnership– Percentage - Profit & loss – Discount - Mixture and Allegation | **[5]** |
| **Quantitative Aptitude – Part 3**<br>Time & Work  - Pipes and cistern – Time, Speed & distance -  Trains -  Boats and Streams - Simple interest and Compound interest | **[5]** |
| **Total Hours** | **25** |

| | Reference(s): |
|---|---|
| 1. | Aggarwal, R.S. *'A Modern Approach to Verbal and Non-verbal Reasoning'*, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi. |
| 2. | Abhijit Guha, *'Quantitative Aptitude'*, McGraw Hill Education, 6th edition, 2016 |
| 3. | Dinesh Khattar, 'Quantitative Aptitude For Competitive Examinations', Pearson Education2020 |
| 4. | Anne Thomson, *'Critical Reasoning: A Practical Introduction'* Lexicon Books, 3rd edition,2022. Warszaw |

## Course Contents and Lecture Schedule

| S.No | Topic | No. of Hours |
|---|---|---|
| **1** | **Logical Reasoning** | |
| 1.1 | Analogies - Alpha and numeric series | 1 |
| 1.2 | Number Series - Coding and Decoding | 1 |
| 1.3 | Blood Relations - Coded Relations | 1 |
| 1.4 | Order and Ranking – odd man out | 1 |
| 1.5 | Direction and distance | 1 |
| **2** | **Quantitative Aptitude – Part 1** | |
| 2.1 | Number system | 1 |

| 2.2 | Squares & cubes - Divisibility | 1 |
|------|--------------------------------|---|
| 2.3 | Unit digits - Remainder Theorem | 1 |
| 2.4 | HCF & LCM- Geometric and Arithmetic progression | 1 |
| 2.5 | Surds & indices | 1 |
| **3** | **Critical Reasoning** | |
| 3.1 | Syllogism | 1 |
| 3.2 | Statements and Conclusions, Cause and Effect | 1 |
| 3.3 | Statements and Assumptions | 1 |
| 3.4 | identifying Strong Arguments and Weak Arguments | 1 |
| 3.5 | Cause and Action -Data sufficiency | 1 |
| **4** | **Quantitative Aptitude – Part 2** | |
| 4.1 | Average - Ratio and proportion | 1 |
| 4.2 | Ages – Partnership | 1 |
| 4.3 | Percentage | 1 |
| 4.4 | Profit & loss | 1 |
| 4.5 | Discount - Mixture and Allegation | 1 |
| | | |
| **5** | **Quantitative Aptitude – Part 3** | |
| 5.1 | Time & Work | 1 |
| 5.2 | Pipes and cistern | 1 |
| 5.3 | Time, Speed & distance - Trains | 1 |
| 5.4 | Boats and Streams | 1 |
| 5.5 | Simple interest and Compound interest | 1 |
| | **Total** | **25** |

**Course Designer**

1. R. Poovarasan          - poovarasan@ksrct.ac.in

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| 60 AM 501 | MACHINE LEARNING | Category | L | T | P | Credit |
|-----------|-----------------|----------|---|---|---|--------|
| | | PC | 3 | 0 | 0 | 3 |

**Objective**

- To understand the basic concepts of machine learning.
- To understand and build supervised learning models.
- To understand and build unsupervised learning models.
- To apply the algorithms based on probabilistic model identified
- To evaluate the machine learning model with different tests

**Prerequisite**

Students will benefit from a good background in probability, algebra, calculus and programming.

**Course Outcomes**

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

| CO1 | Recognize the characteristics of Machine Learning techniques that enable to solve real world problems | Remember, Understand |
|-----|------|------|
| CO2 | Apply various supervised learning methods to appropriate problems | Apply, Analyze, Evaluate |
| CO3 | Construct the unsupervised learning algorithms to solve suitable problems | Apply, Analyze, Evaluate |
| CO4 | Create probabilistic learning models for handling unknown pattern | Apply, Analyze, Evaluate |
| CO5 | Evaluate and compare different models | Create, apply, Evaluate |

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|------|------|------|
| CO1 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 2 | | 2 | | | | 2 | 2 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 | 2 | | | | | | | 2 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |
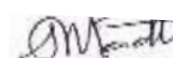
**Assessment Pattern**

| | Continuous Assessment Tests | |
|---|---|---|
| | | |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23
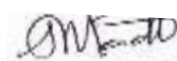
BoS Chairman

| Cognitive Levels | 1 | 2 | 3 | End Semester Examination(Marks) |
|---|---|---|---|---|
| Remember | 10 | - | 10 | 10 |
| Understand | 10 | 10 | 10 | 10 |
| Apply | 10 | 10 | 30 | 10 |
| Analyse | 10 | 10 | 30 | 10 |
| Evaluate | - | 10 | 20 | - |
| Create | - | - | - | - |

### K.S.Rangasamy College of Technology–AutonomousR2022
### 60 AM 501-Machine Learning
### AIML

| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **INTRODUCTION:** Machine Learning–Types of Machine Learning –**Machine Learning process**- preliminaries, testing Machine Learning algorithms, turning data into Probabilities, **and Statistics for Machine Learning Probability theory – Probability Distributions** – Decision Theory. | 9 |
| **SUPERVISED LEARNING:** Linear Models for Regression – Linear Models for Classification- Discriminant Functions, Probabilistic Generative Models, Probabilistic Discriminative Models – Decision Tree Learning – Bayesian Learning, Naïve Bayes – Ensemble Methods, Bagging, Boosting - Support Vector Machines. | 9 |
| **UNSUPERVISED LEARNING:** Clustering- K-means – EM Algorithm- Mixtures of Gaussians –Dimensionality Reduction, Linear Discriminant Analysis, Factor Analysis, Principal Components Analysis, Independent Components Analysis. | 9 |
| **REINFORCEMENT LEARNING AND PROBABILISTIC GRAPHICAL MODELS:** Reinforcement learning – Markov Decision processes, Deterministic and Non-deterministic Rewards and Actions, Graphical Models – Undirected Graphical Models – Markov Random Fields – Directed Graphical Models –Bayesian Networks | 9 |
| **DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS:** Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – $t$ test, Mc Nemar's test, K-fold CV paired $t$ test – Introduction to MLOps. | 9 |
| **Total Hours** | 45 |

**Text Book(s):**

| 1. | Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020. |
|---|---|
| 2. | Stephen Marsland, "Machine Learning: An Algorithmic Perspective, "Second Edition", CRC Press, 2014 |

**Reference(s):**

| 1. | Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", Second Edition, MIT Press, 2018. |
|---|---|
| 2. | Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2017. |

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BoS Chairman

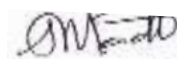| S.No. | | Topic | | |
| --- | --- | --- | --- | --- |
| 3. | Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2018 | | | |
| 4. | K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2016. | | | |

**\*SDG:4- Quality Education**

**Course Contents and Lecture Schedule**

| S.No. | Topic | No. of Hours |
| --- | --- | --- |
| 1 | **INTRODUCTION** | |
| 1.1 | Introduction to Machine Learning | 1 |
| 1.2 | Types of Machine Learning | 1 |
| 1.3 | Machine Learning process | 1 |
| 1.4 | Preliminaries and testing | 1 |
| 1.5 | Probabilities statistical models | 1 |
| 1.6 | Probability theory | 1 |
| 1.7 | Probability Distributions | 1 |
| 1.8 | Decision Theory | 1 |
| 1.9 | Example with Implementation | 1 |
| 2 | **SUPERVISED LEARNING** | |
| **2.1** | Regression | 1 |
| 2.2 | Linear models | 1 |
| 2.3 | Discriminant Functions | 1 |
| 2.4 | Probabilistic Generative & Discriminative Models | 1 |
| 2.5 | Decision Tree Learning | 1 |
| 2.6 | Implementation | 1 |
| 2.7 | Naïve Bayes - Implementation | 1 |
| 2.8 | Ensemble Methods – Bagging & Boosting | 1 |
| 2.9 | Support Vector Machine Implementation | 1 |
| **3** | **UNSUPERVISED LEARNING** | |
| 3.1 | Introduction to Clustering | 1 |
| 3.2 | K-means Implementation | 1 |
| 3.3 | EM Algorithm - Implementation | 1 |
| 3.4 | Mixtures of Gaussians | 1 |
| 3.5 | Dimensionality Reduction | 1 |
| 3.6 | Linear Discriminant Analysis | 1 |
| 3.7 | Factor Analysis | 1 |

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| 3.8 | Principal Components Analysis | 1 |
|---|---|---|
| 3.9 | Independent Components Analysis | 1 |
| **4** | **REINFORCEMENT LEARNING AND PROBABILISTIC GRAPHICAL MODELS** | |
| 4.1 | Introduction to Reinforcement learning | 1 |
| 4.2 | Markov Decision processes | 1 |
| 4.3 | Deterministic - Rewards and Actions | 1 |
| 4.4 | Non-deterministic - Rewards and Actions | 1 |
| 4.5 | Implementations | 1 |
| 4.6 | Graphical Models – Undirected Graphical Models | 1 |
| 4.7 | Markov Random Fields | 1 |
| 4.8 | Directed Graphical Models | 1 |
| 4.9 | Bayesian Networks | 1 |
| **5** | **DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS** | |
| 5.1 | Guidelines | 1 |
| 5.2 | Cross Validation – Design & Implementation | 1 |
| 5.3 | Resampling | 1 |
| 5.4 | K-fold CV Techniques | 1 |
| 5.5 | bootstrapping, measuring classifier performance | 1 |
| 5.6 | Assessing & Comparison | 1 |
| 5.7 | $T$ test | 1 |
| 5.8 | McNemar's test | 1 |
| 5.9 | K-fold CV paired $t$ test | 1 |
| | **Total** | 45 |

**Course Designers**

1. Mr.Rajkumar S – rajkumars@ksrct.ac.in
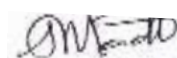
| | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **60 AM 502** | **OPERATING SYSTEMS** | PC | 3 | 0 | 2 | 4 |

**Objective**

- To describe the services provided by and the design of an operating system.
- To understand the structure and organization of the file system, processes synchronization,

process scheduling, system calls and different approaches to memory management.

**Prerequisite**

Basic Knowledge of Data Storage and Management

**Course Outcomes**

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

| CO1 | Recognize the basics of system software, operating systems and its structures | Understand |
|-----|-------------------------------------------------------------------------------|------------|
| CO2 | Analyze the process scheduling and synchronization problem | Analyze |
| CO3 | Examine the deadlocks and memory management | Analyze |
| CO4 | Comprehend the file concepts and directory structure | Analyze |
| CO5 | Recognize the concepts of allocation methods and disk scheduling. | Analyze |

**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 2 | 2 | | | | | | | | | 3 | 3 | |
| CO2 | 3 | 3 | 3 | 3 | | | 2 | | | 2 | | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | | | 2 | | | 2 | | 2 | 3 | |
| CO4 | 3 | 2 | 3 | | | | | | | | | 2 | 3 | |
| CO5 | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | 3 | 2 |
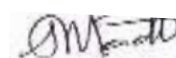
**Assessment Pattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination(Marks) |
|------------------|------|------|------|---------------------------------|
| | 1 | 2 | 3 | |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 20 | 20 | 20 | 40 |
| Analyse | 10 | 10 | 10 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

| K.S.RangasamyCollegeofTechnology–AutonomousR2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 502-Operating Systems** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Totalhrs | Credit | MaximumMarks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 2 | 60 | 4 | 50 | 50 | 100 |

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23
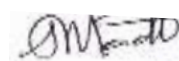
BoS Chairman

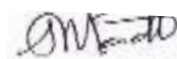| | |
|---|---|
| **Concepts of Operating Systems\*** <br><br> **Computer system overview - concept of an operating system - batch system –** <br> **multiprogramming – multiprocessing - multi user - time sharing - personal system -** <br> **parallel system - real time system - simple monitors - general system architecture -** <br> **System components - operating system services - system calls - system programs -** <br> **system structure - Approaches to OS design and implementation: Microkernel, Layered,** <br> **Kernel Approach - Mobile operating systems:Symbian OS, Android OS,iphone(iOS)** | [9] |
| **Processes and Threads\*** <br> **Concept of process - process states - process state transitions - process control block** <br> **- operations on processes – threads - concurrent processes - mutual exclusion and** <br> **synchronization - principles of deadlocks - integrated deadlocks strategy - scheduling** <br> **levels - scheduling criteria - Inter process synchronization - Inter process** <br> **communication – Linux - IPC Mechanism - Remote procedure calls - RPC exception** <br> **handling - security issue** | [9] |
| **Memory Management and Data Management\*** <br> **Logical and physical address space - storage allocation and management techniques -** <br> **swapping concepts of multi programming – paging – segmentation - virtual storage** <br> **management strategies - demand paging - page replacement algorithm – thrashing** - File <br> organization - record blocking - access method - directory structure - protection file system <br> structure - allocation methods - free space management - directory implementation - disk <br> structure - disk scheduling - disk management – buffering - swap space management - RAID <br> levels | [9] |
| **OS Security\*** <br> **Types of Threats in OS - Basic OS Security Mechanisms - Understanding the Threats -** <br> **Malware Taxonomy – Viruses** – Worms – Rootkits –Defence: An Overview – Logging – <br> Auditing - and Recovery - OS-level Memory Protection | [9] |

**Case Studies and OS Abstractions\***
**Linux/Unix OS design and architecture - Unix shell - Unix operating system services - user perspective - representation of files in Unix system processes and their structure – input - output system - memory management in Unix** - Processes: fork – wait – exec – exit – kill – getpid – brk – nice – sleep – trace - Files: open – close – read – write – lseek – stat – sync - Directories: mkdir – rmdir – link – unlink – mount – umount users + - Security: chown – chmod – getuid – setuid - Inter process communication: signals – pipe - Networking: socket – accept – snd – recv – connect

**List of Experiments**

| | | |
|---|---|---|
| 1 | Installation of operating system and implementation of basic Shell programming concepts like loops,Functions,Patterns,Substitutions. | |
| 2 | Familiarization with System calls for Process and interprocess communications. | |
| 3 | Implement the operationon process. | [9] |
| 4 | Implement and analyze the scheduling criteria's of CPU Scheduling Algorithms. | |
| 5 | Implement Deadlock avoidance mechanism from deadlock in a realtime environment using C. | |
| 6 | Implement Classic problem of Synchronization using semaphores. | |
| 7 | Implement Contiguous Memory Allocation. | |
| 8 | Implement Pagereplacement algorithm. | |
| 9 | Implement various file allocation Methods. | |
| 10 | Implement DiskScheduling to find the seektime of accessing the required information using different Scheduling algorithm. | |

| | |
|---|---|
| **Total Hours(45+15)** | 60 |

**Text Book(s):**

| | |
|---|---|
| 1. | Galvin &Silberschatz – "Operating System", 7th Edition, John Willey 2004. |
| 2. | Dhamdhare, "Operating Systems-A Concept Based Approach" - TMH 2006. |

**Reference(s):**

| | |
|---|---|
| 1. | EktaWalia, "Operating System Concepts", Khanna Book Publishing - 2020. |
| 2. | William Stallings, "Operating systems Internals and design principles" ,Pearson Education- 2012 |
| 3. | Crowley, "Operating Systems –A Design Oriented Approach", TMH -2001 |
| 4. | Andrew S. Tanenbaum, "Operating systems Design and Implementation" - Pearson Education - 2009 |

**\*SDG - 9 : Innovation**
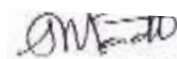
## Course Contents and Lecture Schedule

| S.No | Topic | No.of Hours |
|---|---|---|
| **1** | **Concepts of Operating Systems** | |
| 1.1 | Computer system overview-concept of an operating system | 1 |
| 1.2 | Batch system-multiprogramming | 1 |
| 1.3 | Multiprocessing-multi user | 1 |
| 1.4 | Time sharing-personal system | 1 |
| 1.5 | Parallel system-real time system | 1 |
| 1.6 | Simple monitors-general system architecture | 2 |
| 1.7 | System components | 1 |
| 1.8 | Operating system services-system calls | 1 |
| 1.9 | System programs-system structure | 1 |
| 1.10 | Approaches to OS design and implementation: Microkernel | 1 |
| 1.11 | Mobile operating systems | 1 |
| **2** | **Processes and Threads** | |
| 2.1 | Concept of process-process states | 1 |
| 2.2 | Process state transitions-process control block | 1 |
| 2.3 | Operations on processes-threads | 1 |
| 2.4 | Concurrent processes-mutual exclusion and synchronization | 1 |
| 2.5 | Principles of deadlocks-integrated deadlocks strategy | 1 |
| 2.6 | Scheduling levels-scheduling criteria | 1 |
| 2.7 | Inter process synchronization-Inter process communication | 1 |
| 2.8 | Linux-IPC Mechanism | 1 |
| 2.9 | Remote procedure calls-RPC exception handling-Security issues | 2 |
| **3** | **Memory Management and Data Management** | |
| 3.1 | Logical and physical address space-storage allocation and management techniques | 1 |
| 3.2 | swapping concepts of multi programming-paging-segmentation | 1 |
| 3.3 | virtual storage management strategies-demand paging, | 1 |
| 3.4 | page replacement algorithm-thrashing-File organization | 1 |
| 3.5 | record blocking-accessmethod-directory structure | 1 |
| 3.6 | protection file system structure-allocation methods-free space management | 1 |
| 3.7 | directory implementation-disk structure-disk scheduling | 1 |
| 3.8 | disk management-buffering-swap space management-RAID levels | 1 |
| **4** | **OS Security** | |
| 4.1 | Types of Threats in OS | 1 |
| 4.2 | Basic OS Security Mechanisms | 1 |
| 4.3 | Understanding the Threats: Malware Taxonomy: Viruses-Worms | 1 |
| 4.4 | Rootkits | 1 |
| 4.5 | Defence: An Overview | 1 |
| 4.6 | Logging | 1 |
| 4.7 | Auditing and Recovery | 1 |

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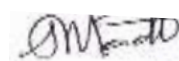Approved in Academic Council Meeting held on 23/12/23

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| 4.8 | OS-level Memory Protection | 1 |
|------|---------------------------|---|
| **5** | **Case Studies and OS Abstractions** | |
| 5.1 | Linux/Unix OS design and architecture- Unix shell | 2 |
| 5.2 | Unix operating system services | 1 |
| 5.3 | User perspective | 1 |
| 5.4 | Representation of files in Unix system processes and their structure | 1 |
| 5.5 | Input-output system | 1 |
| 5.6 | Memory management in Unix, Processes: fork, wait, exec, exit, kill, getpid, brk, nice, sleep, trace | 1 |
| 5.7 | Files: open, close, read, write, lseek, stat, sync, | 2 |
| 5.8 | Directories: mkdir, rmdir, link, unlink, mount, umount users + | 1 |
| 5.9 | Security: chown, chmod, getuid, setuid, | 1 |
| 5.10 | Inter process communication: signals, pipe, | 1 |
| 5.11 | Networking: socket, accept, snd, recv, connect | 1 |
| | **Total** | **50** |

## Course Designers

1. Mrs.R.KABILA- kabila@ksrct.ac.in

| 60 AM 503 | Computer Networks | Category | L | T | P | Credit |
|-----------|------------------|----------|---|---|---|--------|
|           |                  | PC | 3 | 0 | 0 | 3 |

**Objective**

- To have an understanding of the fundamental concepts of computer networking and have a basic knowledge of the various network models and their uses.
- To analyse simple protocols and independently study literature concerning computer networks.

**Prerequisite**

Basic Knowledge of programming and architecture

**CourseOutcomes**

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

| CO1 | Understand basic computer network technology. | Apply |
|-----|----------------------------------------------|-------|
| CO2 | Understand the different types of network topologies and protocols. | Analyze |
| CO3 | Analyze the different types of network devices and their functions within a network. | Apply |
| CO4 | Analyze the architecture and principles of today's computer networks. | Apply |
| CO5 | Understand the requirements for the future Internet and its impact on the computer network architecture. | Analyze |

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1 | 2 | 3 |   |   |   |   |   |   |   |   |   | 2 |   | 3 |
| CO2 | 3 | 3 |   | 2 |   |   |   |   |   |   |   | 2 | 3 | 2 |
| CO3 | 3 | 2 |   | 2 | 3 |   |   | 3 | 3 | 3 |   | 2 | 3 | 3 |
| CO4 | 3 | 3 |   |   | 2 |   | 2 |   |   |   |   | 2 | 3 | 2 |
| CO5 | 3 | 3 |   |   | 2 |   |   | 2 | 2 | 2 |   | 2 |   | 2 |
| 3- Strong;2-Medium;1-Some |
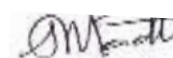
**Assessment Pattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination(Marks) |
|------------------|------|------|------|--------------------------------|
|                  | 1 | 2 | 3 |  |
| Remember | 10 | 10 | 10 | 20 |
| Understand | 10 | 10 | 10 | 20 |
| Apply | 20 | 20 | 20 | 40 |
| Analyse | 10 | 10 | 10 | 20 |
| Evaluate | - | - | - | - |
| Create | - | - | - | - |

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| | 60 AM 503-Computer Networks | | | | | | |
|---|---|---|---|---|---|---|---|
| | AIML | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Computer Networks and The Internet \*** <br> **What is the Internet - network edge - network core – Delay - Loss and throughput in Packet - Switched Networks -** Protocol Layers and their Service Models | | [9] |
| **Application Layer \*** <br> Principles of Network Applications - **The Web and HTTP - File Transfer: FTP - Electronic Mail in the Internet - DNS - The Internet's Directory Service - Peer-to-Peer applications - Socket Programming – Creating network applications**. | | [9] |
| **Transport Layer** <br> Introduction and Transport-Layer Services - Multiplexing and Demultiplexing - Connectionless Transport: UDP - Principles of Reliable of Data Transfer - Connection-Oriented Transport: TCP - Principles of Congestion Control - TCP Congestion Control. | | [9] |
| **Network Layer** <br> Introduction - Virtual circuit and datagram networks - What is inside a router - Internet Protocol (IP): Forwarding and Addressing in the Internet - Routing Algorithms - Routing in the Internet - Broadcast and Multicast Routing. | | [9] |
| **Data Link Layer** <br> Introduction to the link layer - Error Detection and Correction Techniques - Multiple Access links and Protocols - Switched local area networks. | | [9] |
| | **Total Hours** | 45 |

**Text Book(s):**

| | |
|---|---|
| 1. | James F. Kurose and Keith W. Ross, "Computer Networking: A top-down approach", Pearson Education, 6th edition. 2012 |
| 2. | A.S. Tanenbaum, "Computer Networks", 5th Edition, PHI 2018 |

**Reference(s):**

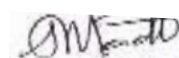| | |
|---|---|
| 1. | Bhavneet Sidhu, "An Integrated Approach to Computer Networks", Khanna Book Publishing House 2019. |
| 2. | G. Keiser, "Local Area Networks", 2nd Edition, TMH 2018 |
| 3. | D. Bertesekas and R. Gallager, "Data Networks", 2nd Edition, PHI 2018 |
| 4. | William Stallings, "Data & Computer Communication", PHI, 10th Edition 2013 |
| 5. | B.A. Forouzan, "Data communications and networking", TMH, 5th Edition2012 |

**\*SDG:4- Quality Education**

**Course Contents and Lecture Schedule**

| S.No | Topic | No.of Hours |
|---|---|---|
| **1** | **Computer Networks and The Internet** | |

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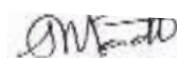
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| 1.1 | What is the Internet | 1 |
|------|-----------------------------------------------------------------|----|
| 1.2 | Types and application | 1 |
| 1.3 | network edge | 1 |
| 1.4 | network core | 1 |
| 1.5 | Delay | 1 |
| 1.6 | Loss and throughput | 2 |
| 1.7 | Packet-Switched Networks | 1 |
| 1.8 | Protocol Layers | 1 |
| 1.9 | Service Models | 1 |
| **2** | **Application Layer** | |
| 2.1 | Principles of Network Applications | 1 |
| 2.2 | The Web and HTTP | 1 |
| 2.3 | File Transfer: FTP | 1 |
| 2.4 | Electronic Mail in the Internet | 1 |
| 2.5 | DNS - The Internet's Directory Service | 1 |
| 2.6 | Peer-to-Peer applications | 2 |
| 2.7 | Socket Programming – Creating network applications | 2 |
| **3** | **Transport Layer** | |
| 3.1 | Introduction and Transport-Layer Services | 1 |
| 3.2 | Multiplexing and Demultiplexing | 1 |
| 3.3 | Connectionless Transport: UDP | 1 |
| 3.4 | Principles of Reliable of Data Transfer | 1 |
| 3.5 | Connection-Oriented Transport: TCP | 1 |
| 3.6 | Principles of Congestion Control | 1 |
| 3.7 | TCP Congestion Control | 2 |
| 4 | **Network Layer** | |
| 4.1 | Introduction | 1 |
| 4.2 | Virtual circuit and datagram networks | 1 |
| 4.3 | What is inside a router | 1 |
| 4.4 | Internet Protocol (IP): Forwarding and Addressing in the Internet | 1 |
| 4.5 | Routing Algorithms | 1 |
| 4.6 | Routing in the Internet | 1 |
| 4.7 | Broadcast and Multicast Routing | 2 |
| **5** | **Data Link Layer** | |
| 5.1 | Introduction to the link layer | 2 |
| 5.2 | Error Detection | 1 |
| 5.3 | Error Correction Techniques | 1 |
| 5.4 | Multiple Access links | 1 |
| 5.5 | Protocols | 1 |
| 5.6 | Switched local area networks | 1 |
| | **Total** | **45** |

<br>

## Course Designers

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1. Dr.P.Senthilraja- senthilraja@ksrct.ac.in

| 60 AM 504 | Design Thinking | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 3 | 0 | 0 | 3 |

### Objective

- Learn the innovation cycleof Design Thinking process for developing innovative products.
- Learn Design Thinking as a Problem Solving approach to tackle problems innovatively.
- Imbibe the knack of "Asking the Right Questions" to solve problems correctly.
- Imbibe and immerse into Design Tools to enhance user experience, prototype, etc.,
- Apply Design Thinking Tools to visualize holistic development of budding idea.

### Prerequisite

NIL

### Course Outcomes

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

| CO1 | Compare and classify the various learning styles and memory techniques and Apply them in theirengineering education | Understand |
|---|---|---|
| CO2 | Analyze emotional experience and Inspect emotional expressions to better understand users whiledesigning innovative products | Understand |
| CO3 | Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking processfor developing innovative products | Apply |
| CO4 | Propose real-time innovative engineering product designs and Choose appropriate frameworks,strategies, techniques during prototype development | Apply |
| CO5 | Perceive individual differences and its impact on everyday decisions and further Create a bettercustomer experience | Analyze |

### Mapping with Programme Outcomes
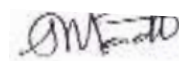
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 2 | | 3 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 3 | 2 | 2 | | | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | | 3 | 3 | 2 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |

### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Semester Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 20 |

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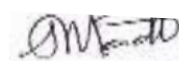
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| | | | |
|---|---|---|---|
| Understand (Un) | 20 | 20 | 30 |
| Apply (Ap) | 20 | 20 | 30 |
| Analyze (An) | 10 | 10 | 20 |
| Evaluate (Ev) | - | - | - |
| Create (Cr) | - | - | - |
| Total | 60 | 60 | 100 |

| K.S.Rangasamy College of Technology – Autonomous    R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM 504 Design Thinking** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **An Insight to Learning and remembering memory**<br><br>Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting - Understanding the Memory process, Problems in retention, Memory enhancement techniques- Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers | **[9]** |
| **Basics of Design Thinking**<br><br>Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts& Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define,Ideate, Prototype, Test | **[9]** |
| **Being Ingenious & Fixing Problem**<br><br>Understanding Creative thinking process, Understanding Problem Solving, Testing **Creative Problem Solving - Process of Engineering Product Design*** Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design | **[9]** |
| **Prototyping & Testing**<br><br>Prototype - Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing - Understanding Individual differences & Uniqueness, Group Discussion and Activities to encouragethe understanding, acceptance and appreciation of Individual differences. | **[9]** |
| **Design Thinking & Customer Centricity**<br><br>Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design - Feedback, Re-Design & Re-Create - Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation | **[9]** |
| **Total Hours** | **45** |

| Text book(s): | |
|---|---|
| 1. | Christian Mueller-Roterberg, Handbook of Design Thinking - Tips & Tools for how to design thinking |
| 2. | Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie. |
| 3. | Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown. |

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| | Reference(s): |
|---|---|
| 1. | Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017. |
| 2. | Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press |
| 3. | Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011 |
| 4. | http://ajjuliani.com/design-thinking-activities/ |
| 5 | https://venturewell.org/class-exercises |

**SDG\*4-Quality Education**
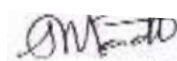
**SDG\*\*9-Industry Innovation and Infrastructure**


**Course Contents and Lecture Schedule**

| S.No. | Topic | No. of Hours |
|---|---|---|
| 1 | **AN INSIGHT TO LEARNING AND REMEMBERING MEMORY** | |
| 1.1 | Understanding the Learning Process | 1 |
| 1.2 | Kolb's Learning Styles | 1 |
| 1.3 | Assessing and Interpreting | 1 |
| 1.4 | Understanding the Memory process | 1 |
| 1.5 | Memory enhancement techniques | 1 |
| 1.6 | Understanding Emotions: Experience & Expression | 2 |
| 1.7 | Assessing Empathy | 1 |
| 1.8 | Application with Peers | 1 |
| 2 | **BASICS OF DESIGN THINKING** | |
| 2.1 | Need for Design Thinking | 1 |
| 2.2 | Objective of Design Thinking | 1 |
| 2.3 | Concepts&Brainstorming, Stages of Design Thinking Process | 2 |
| 2.4 | Empathize, Define | 2 |
| 2.5 | Ideate | 1 |
| 2.6 | Prototype | 1 |
| 2.7 | Test | 1 |
| 3 | **BEING INGENIOUS & FIXING PROBLEM** | |
| 3.1 | Understanding Creative thinking process | 1 |
| 3.2 | Understanding Problem Solving | 1 |
| 3.3 | Testing CreativeProblem Solving | 1 |
| 3.4 | Process of Engineering Product Design | 1 |
| 3.5 | Design Thinking Approach | 1 |

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| 3.6 | Stages of Product Design | 1 |
|------|--------------------------|---|
| 3.7 | Examples of best product designs and functions | 2 |
| 3.8 | Engineering Product Design | 1 |
| **4** | **PROTOTYPING & TESTING** | |
| 4.1 | Prototype | 1 |
| 4.2 | Rapid Prototype Development process | 2 |
| 4.3 | Testing, Sample Example | 2 |
| 4.4 | Test Group Marketing | 1 |
| 4.5 | Understanding Individual differences & Uniqueness | 1 |
| 4.6 | Acceptance and appreciation of Individual differences. | 2 |
| **5** | **DESIGN THINKING & CUSTOMER CENTRICITY** | |
| 5.1 | Practical Examples of Customer Challenges | 1 |
| 5.2 | Use of Design Thinking to Enhance Customer Experience | 1 |
| 5.3 | Parameters of Product experience | 1 |
| 5.4 | Alignment of Customer Expectations with ProductDesign | 1 |
| 5.5 | Re-Design & Re-Create | 1 |
| 5.6 | Focus on User Experience | 1 |
| 5.7 | User focused design | 1 |
| 5.8 | Rapid prototyping & testing | 1 |
| 5.9 | Final Presentation | 1 |
| | **Total** | 45 |

## Course Designers

1. M. Varshana Devi- varshanadevi@ksrct.ac.in
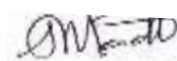
| | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **60 AB 001** | **NATIONAL CADET CORPS - AIR WING** | - | 2 | 0 | 2 | 3 |

### Objective
- To designed especially for NCC Cadets to educate basic military knowledge
- To develop character, camaraderie, discipline, secular outlook
- To inculcate spirit of adventure, sportsman spirit
- To teach selfless service amongst cadets by working in teams
- To learning military subjects including weapon training and motivate them to join in tri-services

## Prerequisite

NIL

## Course Outcomes

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

| CO1 | Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion | Remember |
|-----|---|---|
| CO2 | Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling | Remember |
| CO3 | Illustrate various forces and moments acting on aircraft | Understand |
| CO4 | Outline the concepts of aircraft engine and rocket propulsion | Understand |
| CO5 | Design, build and fly chuck gliders/model airplanes and display static models | Create |

## Mapping with Programme Outcomes

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

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom"s Taxonomy
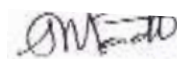
## Assessment Pattern

| Bloom's Category | Continuous Assessment (Marks) | | | End Sem Examination (Marks) |
|---|---|---|---|---|
|  | DST(20) | AM(20) | SBM(10) |  |
| Remember | 10 | 00 | 00 | 40 |
| Understand | 10 | 00 | 10 | 60 |
| Apply | 00 | 00 | 00 | 00 |
| Analyse | 00 | 00 | 00 | 00 |
| Evaluate | 00 | 00 | 00 | 00 |
| Create | 00 | 20 | 00 | 00 |

DST - Drill Square Test     AM - Aero Modeling     SBM - Swachh Bharat Mission

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| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AB 001 – National Cadet Corps - Air Wing** | | | | | | | |
| **Common to ALL Branches** | | | | | | | |
| Semester | Hours/Week | | | Total Hrs | Credit C | Maximum Marks | | |
| | L | T | P | | | CA | ES | Total |
| V | 2 | 0 | 2 | 45 | 3 | 50 | 50 | 100 |

| **Objective(s)** | • To designed especially for NCC Cadets<br>• To develop character, camaraderie, discipline, secular outlook<br>• To inculcate spirit of adventure, sportsman spirit<br>• To teach selfless service amongst cadets by working in teams<br>• To learning military subjects including weapon training and motivate them to join in tri-services |
|---|---|
| **Course Outcomes** | **At the end of the course, the student will be able to**<br>**CO1:** Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.<br>**CO2:** Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling<br>**CO3:** Illustrate various forces and moments acting on aircraft<br>**CO4:** Outline the concepts of aircraft engine and rocket propulsion<br>**CO5:** Design, build and fly chuck gliders/model airplanes and display static models. |

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

| **NCC Organization and National Integration**<br>NCC Organization — History of NCC- NCC Organization- NCC Training- NCC Uniform — Promotion of NCC cadets — Aim and advantages of NCC Training- NCC badges of Rank- Honors" and Awards – Incentives for NCC cadets by central and state govt. History and Organization of IAF- Indo-Pak War-1971- Operation Safed Sagar. National Integration- Unity in diversity- Contribution of youth in nation building- National integration council- Images and Slogans on National Integration. | **[9]** |
|---|---|
| **Drill and Weapon Training**<br>Basic physical Training- Various exercises for fitness (with Demonstration)- Food- Hygiene and Cleanliness. Drill- Words of commands- Position and commands- Sizing and forming- Saluting- Marching- Turning on the march and wheeling- Saluting on the march- Side pace, Pace forward and to the rear- Marking time- Drill with arms- Ceremonial drill- Guard mounting.( WITH DEMONSTRATION) | **[9]** |
| **Principles of Flight**<br>Laws of motion- Forces acting on aircraft- Bernoulli"s theorem- Stalling-Primary control surfaces- Secondary control surfaces- Aircraft recognition. | **[9]** |
| **Aero Engines**<br>Introduction of Aero engine- Types of engine- Piston engine- Jet engines- Turboprop engines- Basic Flight Instruments- Modern trends. | **[9]** |
| **Aero Modeling**<br>History of Aero modeling- Materials used in Aero modeling- Types of Aero models – Static Models- Gliders-Control line models- Radio Control Models- Building and Flying of Aero models. | **[9]** |
| **Total Hours** | **45** |

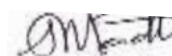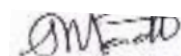| **Text Books:** | |
|---|---|
| 1. | "National Cadet Corps- A Concise handbook of NCC Cadets", Ramesh Publishing House, New Delhi, 2014. |
| **Reference(s):** | |
| 1. | "Cadets Handbook – Common Subjects SD/SW", published by DG NCC, New Delhi. |

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| 2. | "Cadets Handbook- Specialized Subjects SD/SW", published by DG NCC, New Delhi. |
| 3. | "NCC OTA Precise", published by DG NCC, New Delhi. |

**ASSESSMENT PATTERN - THEORY**

| Test / Bloom'sCategory* | Knowledge (K1) % | Apply (K2) % | Analyzing(K3) % | Creating(K4) % | |
|---|---|---|---|---|---|
| CAT1 | - | - | - | - | - |
| CAT2 | - | - | - | - | - |
| CAT3 | - | - | - | - | - |
| ESE | The examination and award of marks will be done by the Ministry of Defence, Government of India which includes all K1 to K4 knowledge levels. The maximum marks for the End Semester Examination is 500 marks. It will be converted to 100 marks. | | | | |

## Course Designers

1. Flt Lt V.R.SADASIVAM - sadasivam@ksrct.ac.in

| **60 AB 002** | **National Cadet Corps - Army Wing** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | - | 2 | 0 | 2 | 3 |

## Objective

- Develop character, camaraderie
- Inculcate discipline, secular outlook
- Enrich the spirit of adventure, sportsman spirit
- Ideals of selfless service amongst cadets by working in teams
- Improve qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets.

## Prerequisite

NIL

## Course Outcomes

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

| CO1 | Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion. | Understand |
|---|---|---|
| CO2 | Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turn out, develop the quality of immediate and implicit obedience of orders. | Apply |
| CO3 | Basic knowledge of weapons and their use and handling. | Understand |
| CO4 | Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils | Analyse |

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| CO5 | Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles | Apply |
|---|---|---|

**Mapping with Programme Outcomes**

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

3- Strong; 2-Medium; 1-Some

**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests(Marks) | | End Sem Examination(Marks) |
|---|---|---|---|
|  | **1** | **2** |  |
| Remember | 10 | 10 | 20 |
| Understand | 20 | 10 | 20 |
| Apply | 20 | 20 | 20 |
| Analyse | 10 | 10 | 20 |
| Evaluate | 0 | 0 | 20 |
| Create | 0 | 0 | 20 |
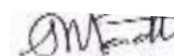
## Syllabus

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60 AB 002 – National Cadet Corps (Army Wing) | | | | | | | | |
| Common to all Branches | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
|  | L | T | P |  | C | CA | ES | Total |
| V | 2 | 0 | 2 | 45 | 3 | 50 | 50 |  |

| **NCC Organization & National Integration**<br>NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training- NCC badges of Rank- Honors' and Awards – Incentives for NCC cadets by central and state govt. National Integration - Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration | [09] |
|---|---|
| **Basic Physical Training & Drill**<br>Basic physical Training – various exercises for fitness (with Demonstration)-Food – Hygiene and Cleanliness. Drill- Words of commands- position and commands- sizing and forming- saluting- marching-turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear-marking time- Drill with arms- ceremonial drill- guard mounting.( WITH DEMONSTRATION). | [09] |

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| | | |
|---|---|---|
| **Weapon Training**<br>Main Parts of a Rifle- Characteristics of .303 rifle- Characteristics of .22 rifle- loading and unloading – position and holding safety precautions – range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing( WITH PRACTICE SESSION) - Characteristics of 5.56mm rifle- Characteristics of 7.62mm SLR- LMG- carbine machine gun – pistol. | [09] |
| **Social Awareness and Community Development**<br>Aims of Social service-Various Means and ways of social services- family planning – HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA-SGSYJGSY-NSAP-PMGSY-Terrorism and counter terrorism- Corruption – female foeticide -dowry –child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility | [09] |
| **Specialized Subject (ARMY)**<br>Basic structure of Armed Forces- Military History – War heroes- battles of Indo-Pak war- Param Vir Chakra- Career in the Defence forces- Service tests and interviews. | [09] |
| **Total Hours** | **45** |

**Text Book(s):**

| | |
|---|---|
| 1. | National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014 |
| 2. | Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi ,2014 |

**Reference(s):**

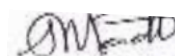| | |
|---|---|
| 1. | "Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019 |
| 2. | "Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017 |

**Course Contents and Lecture Schedule**

| S.No | Topic | No. of Hours |
|---|---|---|
| **1** | **NCC Organization & National Integration** | |
| 1.1 | NCC Organization | 1 |
| 1.2 | History of NCC and  NCC Organization | 1 |
| 1.3 | NCC Training and NCC Uniform | 1 |
| 1.4 | Promotion of NCC cadet, Aim and advantages of NCC Training | 1 |
| 1.5 | NCC badges of Rank, Honors' and Awards, Incentives for NCC cadets by central and state govt | 2 |
| 1.6 | National Integration, Unity in diversity | 1 |
| 1.7 | Contribution of youth in nation building | 2 |
| 1.8 | National integration council | 1 |
| 1.9 | Images and Slogans on National Integration | 2 |
| **2** | **Basic Physical Training & Drill** | |
| 2.1 | Basic physical Training – various exercises for fitness ( with Demonstration)- | 3 |
| 2.2 | Food – Hygiene and Cleanliness . | 1 |
| 2.3 | Drill- Words of commands- position and commands- sizing and forming- | 3 |

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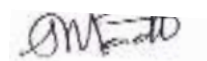| | | | |
|---|---|---|---|
| 2.4 | saluting- marching- turning on the march and wheeling- | 3 |
| 2.5 | saluting on the march- side pace, pace forward and to the rear- marking time- | 3 |
| 2.6 | Drill with arms- ceremonial drill- guard mounting.( WITH DEMONSTRATION) | 3 |
| 3 | **Weapon Training Main Parts of a Rifle** | |
| 3.1 | Characteristics of .303 rifle | 1 |
| 3.2 | Characteristics of .22 rifle | 2 |
| 3.3 | Loading and unloading, position and holding safety precautions | 2 |
| 3.4 | Range procedure, MPI and Elevation- | 2 |
| 3.5 | Group and Snap shooting Long/Short range firing (WITH PRACTICE SESSION) | 3 |
| 3.6 | Characteristics of 5.56 mm rifle | 1 |
| 3.7 | Characteristics of 7.62mm | 1 |
| **4** | **Social Awareness and Community Development** | |
| 4.1 | Aims of Social service, Various Means and ways of social services | 1 |
| 4.2 | Family planning , HIV and AIDS | 1 |
| 4.3 | Cancer its causes and preventive measures | 1 |
| 4.4 | NGO and their activities, Drug trafficking | 1 |
| 4.5 | Rural development programmes | 1 |
| 4.6 | MGNREGA, SGSY, JGSY, NSAP, PMGSY | 2 |
| 4.7 | Terrorism and counter terrorism, Corruption | 1 |
| 4.8 | female foeticide, dowry, child abuse | 1 |
| 4.9 | RTI Act, RTE Act | 1 |
| 4.10 | Protection of children from sexual offences act | 1 |
| 4.11 | Civic sense and responsibility | 1 |
| 5 | **Specialized Subject (ARMY)** | |
| 5.1 | Basic structure of Armed Forces | 1 |
| 5.2 | Military History, War heroes | 1 |
| 5.3 | battles of Indo - Pak war | 1 |
| 5.4 | Param Vir Chakra, | 1 |
| 5.5 | Career in the Defence forces | 2 |
| 5.6 | Service tests and interviews. | 2 |
| | **Total** | 60 |

**Course Designer**

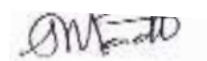CT E CHANDRA KUMAR  -  chandrakumar@ksrct.ac.in

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| 60 AM 5P1 | **MACHINE LEARNING LABORATORY** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 4 | 2 |

### Objective

- To apply the concepts of Machine Learning to solve real-world problems
- To implement basic algorithms of classification applied to the data
- To implement algorithms of clustering techniques
- To implement algorithms related to reinforcement model
- To apply and evaluate the machine learning algorithms with performance tests.

### Prerequisite

Students will benefit from a good background in probability, algebra, calculus and programming

### CourseOutcomes

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

| CO1 | To learn to use anaconda tool for implementing machine learning algorithms related to numeric data | Remember, Understand, Analyze |
|---|---|---|
| CO2 | To apply the application of machine learning algorithms for supervised models | Understand Apply, Analyze |
| CO3 | To apply the application of machine learning algorithms for unsupervised models | Understand Apply, Analyze |
| CO4 | To apply the reinforcement learning models | Understand Apply, Analyze |
| CO5 | To design and analysis of machine learning algorithm with different test. | Apply, Evaluate, Analyze |
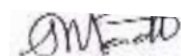
### Mapping with Programme Outcomes

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 2 | | 2 | | | | 2 | 2 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 | 2 | | | | | | | 2 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|
| **60 AM 5P1–Machine Learning Laboratory** | | | | | | | |
| **Common to CS, IT, AD** | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Demonstrate various data pre-processing techniques for a given dataset
2. To implement and solve the classification problem using decision trees
3. To implement the root Node Selection for Decision Trees using Information Gain
4. To Implement and solve the regression problems using simple & multiple linear model
5. To implement SVM classification for chosen domain application.
6. To implement the naïve Bayesian classifier for credit card analysis and compute the accuracy with a few test data sets.
7. To implement the random forest ensemble method on a given dataset.
8. To implement the k-means clustering techniques
9. To implement the dimensionality reduction using Principle Component Analysis.
10. To implement the reinforcement learning algorithm
11. **Evaluate the performance of Linear regression, logistic regression, naïve Bayes and SVM based prediction models for medical datasets.**

**\*SDG:3- Ensure healthy lives and promote well-being for all at**
**all age**

**Course Designers**

1. Mr.Rajkumar S – rajkumars@ksrct.ac.in

| 60 AM 5P2 | **DESIGN THINKING LABORATORY** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 4 | 2 |

**Objective**

- To iterative approach to problem-solving, where ideas, prototypes, and solutions are to develop a deep understanding of users' perspectives, needs, and pain points through empathy.
- To embrace continually refined based on user feedback and testing, leading to improved outcomes.
- To move beyond theoretical discussions and drive action by taking tangible steps toward prototyping and implementing solutions in a real-world context.
- To embrace an iterative approach to problem-solving, where ideas, prototypes, and solutions are continually refined based on user feedback and testing, leading to improved outcomes.

**Prerequisite**
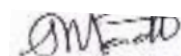
NIL

**CourseOutcomes**

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

| CO1 | Compare and classify the various learning styles and memory techniques and Apply them in theirengineering education | Analyze |
|---|---|---|
| CO2 | Analyze emotional experience and Inspect emotional expressions to better understand users whiledesigning innovative products | Apply, Analyze |
| CO3 | Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking processfor developing innovative products | Apply, Analyze |
| CO4 | Propose real-time innovative engineering product designs and Choose appropriate frameworks,strategies, techniques during prototype development | Apply, Analyze |

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| CO5 | Perceive individual differences and its impact on everyday decisions and further Create a bettercustomer experience | Apply, Evaluate, Analyze |
|------|------|------|

**Mapping with Programme Outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|------|------|------|
| CO1 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO3 | 2 | 2 | 3 | 2 | 2 | 3 | | 2 | | | | 2 | 2 | 2 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 2 | | 2 | | | | 2 | 2 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 | 2 | | | | | | | 2 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

| **K.S.Rangasamy College of Technology – Autonomous R2022** | | | | | | | | |
|------|------|------|------|------|------|------|------|------|
| **60 AM 5P2– Design Thinking Laboratory** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Experimental activity on the product they like and dislike based on their experience-Identify the steps in the Design thinking process.
2. Explanation of Stanford Model-D, Identifies the steps in Empathize phase and target activity.
3. Immersion activity by groups-Define problem statement and recognize steps Ideate phase. Idea on Six thinking hats.
4. Apply design thinking to create a prototype to improve any existing products or service.
5. Peer Review Activity
6. Six thinking hats Game- Combining Immersion and Persona creation to create prototype.
7. Activity on Doodling.
8. Story telling Activity-Agile thinking definition-Define customer perception and expectations-Define product and customer satisfaction.
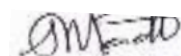9. Test the Prototype.

**Course Designers**

1. M. Varshana Devi- varshanadevi@ksrct.ac.in

| 60 AM 601 | Data and Visual Analytics in AI | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 3 | 0 | 0 | 3 |

**Objective**

- To understand techniques and algorithms for creating effective visualizations based on principles from graphic design.
- To several industry-standard software tools to create a compelling and interactive visualization of various types of data.

**Prerequisite**

Basic Knowledge

**CourseOutcomes**

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

| CO1 | Understand the key techniques and theory used in visualization, including data models, graphical perception, and techniques for visual encoding and interaction. | Understand |
|---|---|---|
| CO2 | Understand graphics pipeline and graphical perception | Understand |
| CO3 | Create the graphical design and heatmap | Create |
| CO4 | Analyze multidimensional data | Analyze |
| CO5 | Apply graph visualization and navigation | Apply |

**MappingwithProgrammeOutcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | | 3 | 2 | | 1 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 3 | 2 | | | | 2 | 1 | | 2 | 2 |
| CO3 | 3 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 1 | | 2 | 1 |
| CO4 | 1 | 1 | 2 | 2 | 3 | | | | | | | | 3 | 3 |
| CO5 | 2 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 3 |
| 3- Strong;2-Medium;1-Some | | | | | | | | | | | | | | |

**AssessmentPattern**

| Cognitive Levels | Continuous Assessment Tests | | | End Semester Examination(Marks) |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| Remember | 10 | 10 | | 20 |
| Understand | 10 | 10 | | 20 |
| Apply | 20 | 30 | | 40 |
| Analyse | 20 | 10 | | 20 |
| Evaluate | - | - | - | - |

Passed in BoS Meeting held on 02/12/23

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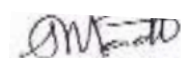
BoS Chairman

| Create | - | - | - | - |
|--------|---|---|---|---|

| K.S.RangasamyCollegeofTechnology–AutonomousR2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM 601- Data and Visual Analytics in AI** | | | | | | | |
| **CS** | | | | | | | |
| Semester | Hours/Week | | | Totalhrs | Credit | MaximumMarks | | |
| | L | T | P | | C | C | ES | Total |
| IV | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction**
Data for Graphics, Design principles, Value for visualization, Categorical, time series, and statistical data graphics, Introduction to Visualization Tools — [9]

**Graphics Pipeline and Aesthetics and Perception**
Introduction, Primitives: vertices, edges, triangles, Model transforms: translations, rotations, scaling, View transform, Perspective transform, window transform, Graphical Perception Theory, Experimentation, and the Application, Graphical Integrity, Layering and Separation, Color and Information, Using Space — [9]

**Visualization Design\***
Visual Display of Quantitative Information, Data-Ink Maximization, Graphical Design, Exploratory Data Analysis, Heat Map — [9]

**Multidimensional Data and Interaction**
Query, Analysis and Visualization of Multi-Dimensional Relational Databases, Interactive Exploration, tSNE, Interactive Dynamics for Visual Analysis, Visual Queries, Finding Patterns in Time Series Data, Trend visualization, Animation, Dashboard, Visual Storytelling — [9]

**Collaboration**
Graph Visualization and Navigation, Online Social Networks, Social Data Analysis, Collaborative Visual Analytics, Text, Map, Geospatial data — [9]

| * Visualization Design : SDG 9 | **TotalHours** | 45 |
|---|---|---|

**Text Book(s):**

1. E. Tufte – "The Visual Display of Quantitative Information" - Graphics Press - 2nd Edition, 2001

2. Jeeva Jose – "Beginner's Guide for Data Analysis using R Programming" - Khanna Publishing – 2019

**Reference(s):**

1. J. Koponen, J. Hildén – "Data Visualization Handbook" – CRC Press – 2019

2. M. Lima – "The Book of Trees: Visualizing Branches of Knowledge" – Princeton Architectural Press – 2014

3. R. Tamassia - "Handbook of Graph Drawing and Visualization" – CRC Press – 2013

4. S. Murray O' – "Interactive Data Visualization for the Web by" - 2nd Edition – 2017

## Course Contents and Lecture Schedule
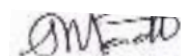
| S.No | Topic | No.of Hours |
|------|-------|-------------|
| **1** | **Introduction** | |
| 1.1 | Data for Graphics | 1 |
| 1.2 | Design principles | 1 |
| 1.3 | Value for visualization | 1 |
| 1.4 | Categorical | 1 |
| 1.5 | time series | 1 |
| 1.6 | statistical data graphics | 2 |
| 1.7 | Introduction to Visualization Tools | 2 |
| **2** | **Graphics Pipeline and Aesthetics and Perception** | |
| 2.1 | Introduction | 1 |
| 2.2 | Primitives: vertices, edges, triangles | 1 |
| 2.3 | Model transforms: translations, rotations, scaling, | 1 |
| 2.4 | View transform | 1 |
| 2.5 | Perspective transform | 1 |
| 2.6 | window transform | 1 |
| 2.7 | Graphical Perception Theory | 1 |
| 2.8 | Experimentation and the Application | 1 |
| 2.9 | Graphical Integrity | 1 |
| **3** | **Visualization Design** | |
| 3.1 | Visual Display of Quantitative Information | 1 |
| 3.2 | Data-Ink Maximization | 2 |
| 3.3 | Graphical Design | 2 |
| 3.4 | Exploratory Data Analysis | 2 |
| 3.5 | Heat Map | 2 |
| **4** | **Multidimensional Data and Interaction** | |
| 4.1 | Query | 1 |
| 4.2 | Analysis and Visualization of Multi-Dimensional Relational Databases | 1 |
| 4.3 | Interactive Exploration | 1 |
| 4.4 | tSNE - Interactive Dynamics for Visual Analysis | 1 |
| 4.5 | Visual Queries | 1 |
| 4.6 | Finding Patterns in Time Series Data | 1 |
| 4.7 | Trend visualization - Animation | 1 |
| 4.8 | Dashboard | 1 |
| 4.9 | Visual Storytelling | 1 |
| **5** | **Collaboration** | |
| 5.1 | Graph Visualization and Navigation | 2 |
| 5.2 | Online Social Networks | 1 |
| 5.3 | Social Data Analysis | 1 |
| 5.4 | Collaborative Visual Analytics | 1 |

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| 5.5 | Text | 1 |
|------|------|---|
| 5.6 | Map | 1 |
| 5.7 | Geospatial data | 2 |
| | **Total** | **45** |

## Course Designers

1. Mr.P.Thangamariappan – thangamariappan@ksrct.ac.in

| 60 AM 602 | DEEP LEARNING | Category | L | T | P | Credit |
|-----------|---------------|----------|---|---|---|--------|
| | | PC | 3 | 0 | 0 | 3 |

### Objective
- To introduce the fundamentals of deep learning and the main research activities in this field
- To learn architectures and optimization methods for deep neural network training

### Prerequisite
Basic Knowledge of Machine Learning

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

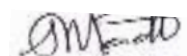| CO1 | Understand the fundamentals of deep learning and the main research activities in this field | Understand, Analyze, Apply |
|-----|---------------------------------------------------------------------------------------------|----------------------------|
| CO2 | Remember architectures and optimization methods for deep neural network training. | Understand, Apply Analyze |
| CO3 | Implement, apply and test relevant learning algorithms in TensorFlow | Remember, Understand, Apply Analyze |
| CO4 | . Critically evaluate the method's applicability in new contexts and construct new applications | Understand, Apply, Analyze |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|

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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 3 | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 2 | 3 | 2 | 3 | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 3 | 3 | | 3 | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 4 | 3 | 2 | 3 | | | | | 3 | 3 | | 3 | 3 | |
| 5 | 3 | 2 | | | | | | 3 | 3 | 2 | | | |

**Assessment Pattern**
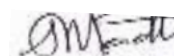
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | **1** | **2** | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 40 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM 602- Deep Learning** | | | | | | | | |
| B.E. Artificial Intelligence and Machine Learning | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction\*** <br> History of Deep Learning**, McCulloch Pitts Neuron, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feed Forward Neural Networks, Back propagation** | **[9]** |
| **Activation functions and parameters** <br> Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Parameters v/s Hyper-parameters | **[9]** |
| **Auto-encoders & Regularization** <br> Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Encoder Decoder Models, Attention Mechanism, Attention over images, Batch Normalization | **[9]** |

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| | Deep Learning Models | |
|---|---|---|
| | Introduction to CNNs, Architecture, Convolution/pooling layers, CNN Applications, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs | **[9]** |
| | **Deep Learning Applications ***<br>**Image Processing, Natural Language Processing, Speech recognition, Video Analytics** | **[9]** |
| | **Total Hours** | **45** |

**Text Book(s):**

| 1. | Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning, the MIT press, 2016 |
|---|---|
| 2. | Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1, Now Publishers, 2009 |

**Reference(s):**

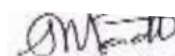| 1. | Deep Learning, Rajiv Chopra, Khanna Book Publishing, Delhi 2020 |
|---|---|
| 2. | https://www.coursera.org/specializations/deep-learning |
| 3. | Graves, A., Wayne, G. & Danihelka, I. Neural Turing machines. http://arxiv.org/abs/1410.5401 (2014) |
| 4. | T. Kautz, B. H. Groh, J. Hannink, U. Jensen, H. Strubberg, and B. M. Eskofier, "Activity recognition in beach volleyball using a DEEp Convolutional Neural NETwork: leveraging the potential of DEEp Learning in sports," Data Mining and Knowledge Discovery, vol. 31, no. 6, pp. 1678–1705, 2017. |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | History of Deep Learning | 1 |
| 1.2 | McCulloch Pitts Neuron | 1 |
| 1.3 | Multilayer Perceptrons (MLPs) | 1 |
| 1.4 | Representation Power of MLPs | 2 |
| 1.5 | Sigmoid Neurons | 2 |
| 1.6 | Feed Forward Neural Networks, Back propagation | 2 |
| **2** | **Activation functions and parameters** | |
| 2.1 | Gradient Descent (GD) | 2 |
| 2.2 | Momentum Based GD | 2 |
| 2.3 | Nesterov Accelerated GD | 1 |
| 2.4 | Stochastic GD, Principal Component Analysis and its interpretations | 2 |
| 2.5 | Singular Value Decomposition | 1 |
| 2.6 | Parameters v/s Hyper-parameters | 1 |
| **3** | **Auto-encoders & Regularization** | |

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| 3.1 | Auto encoders and relation to PCA | 1 |
|------|-----------------------------------|---|
| 3.2 | Regularization in auto encoders, Denoising auto encoders | 2 |
| 3.3 | Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization | 2 |
| 3.4 | Early stopping, Dataset augmentation | 1 |
| 3.5 | Encoder Decoder Models, Attention Mechanism | 2 |
| 3.6 | Attention over images, Batch Normalization | 1 |
| **4** | **Deep Learning Models** | |
| 4.1 | Introduction to CNNs, Architecture | 1 |
| 4.2 | Convolution/pooling layers | 1 |
| 4.3 | CNN Applications, LeNet | 1 |
| 4.4 | AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs | 1 |
| 4.5 | Back propagation through time (BPTT) | 1 |
| 4.6 | Vanishing and Exploding Gradients | 1 |
| 4.7 | Truncated BPTT | 1 |
| 4.8 | GRU, LSTMs | 2 |
| **5** | **Deep Learning Applications** | |
| 5.1 | **Image Processing** | 3 |
| 5.2 | **Natural Language Processing** | 4 |
| 5.3 | **Speech recognition** | 2 |
| 5.4 | **Video Analytics** | |
| | **Total** | 45 |
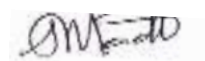
## Course Designers

1. Ms.T.Subbulakshmi - subbulakshmi@ksrct.ac.in

| 60 AM 603 | WEB TECHNOLOGY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 1 | 0 | 3 | 3 |

## Objective

- To Enable the students to learn basic web concepts
- To learn the concepts of scripting languages and server side programming
- To apply the features of XML and JDBC Connectivity
- To Write scripts in JSP and Angular JS
- To make aware of the students about development in web technologies

## Prerequisite

NIL

## CourseOutcomes

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

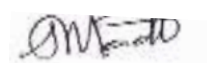| CO1 | Express the features of HTML and Employ various style sheet concepts in HTML | Understand, Analyze, Apply |
|---|---|---|
| CO2 | Describe the basics concepts of JavaScript and express various types events | Understand, Apply Analyze |
| CO3 | Analyzing the concepts of XML and JDBC | Remember, Understand, Apply Analyze |
| CO4 | Gain the knowledge of JSP in server side programming and Express the features of Angular JS with the various effects of elements and events | Understand, Apply, Analyze |
| CO5 | Express the various types of applications | Understand, Apply, Analyze |

## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 2 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 3 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 4 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 5 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |

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Approved in Academic Council Meeting held on 23/12/23
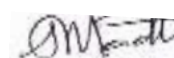
BoS Chairman

**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 40 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|
| **60 AM 603- Web Technology** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 1 | 0 | 3 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **INTRODUCTION**<br> **Internet Basic - Introduction to HTML - List - Creating Table - Linking document - Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document** - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties. | **[9]** |
| **JAVASCRIPT\***<br>**Introduction to Javascript - Advantage of Javascript - Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box – Events.** | **[9]** |
| **XML and JDBC \***<br>Features of XML, The XML Declaration, Element Tags- Nesting and structure, **XML text and text formatting element, Table element, Mark-up Element and Attributes**, Document Type Definition (DTD),.XML Schema-Introduction-**JDBC Architecture**-Types of Drivers-Statement-Result Set-Prepared Statement-Connection Modes-SavePoint-Batch Updations-Callable Statement. | **[9]** |
| **JSP and Angular JS\***<br>**JSP LifeCycle- JSP Directives: page, include, taglib-Jsp Scripting Elements: declaratives, scriptlets-JSP Actions**. Introduction to Angular JS-HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application–MVC Architecture – first Application of AngularJS- Binding – Template Directives – Elements – Events. | **[9]** |

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| | Applications | |
|---|---|---|
| | e-Business Models – Building an e-Business – e-Marketing – Database connectivity – Online Payments – Security - XML and e-Commerce – m-Business. | |
| | **Lab Exercises:** | |
| | 1. Design a personal web page using CSS | **[9]** |
| | 2. Write a Java Script program which makes use of Java Script's inbuilt objects | |
| | 3. Design web page for employee details using XML with database connectivity | |
| | 4. Develop a fully functional website using Angular JS | |
| | 5. Write a JSP program to implement Students mark Statements with database connectivity | |
| | **Total Hours** | **45** |

**Text Book(s):**

| 1. | H.M.Deitel, P.J.Deitel, A.B.Goldberg, "INTERNET and WORLD WIDE WEB – How to program", Pearson education, Third Edition, 2015. |
|---|---|
| 2. | Haggit Attiya and Jennifer Welch, ―Distributed Computing – Fundamentals, Simulations and Advanced Topicsǁ, Second Edition, Wiley, 2016. |

**Reference(s):**

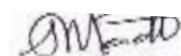| 1. | D.Norton and H. Schildt, "Java 2: The complete Reference", TMH,2016. |
|---|---|
| 2. | Eric Ladd and Jim O'Donnell, et al, "USING HTML 4, XML, and JAVA1.2", PHI publications, 2015. |
| 3. | Jeffy Dwight, Michael Erwin and Robert Nikes "USING CGI", PHI Publications, 2016. |
| 4. | Ken Williamson," Learning AngularJS: A Guide to AngularJS Development", O'Reilly,2017 |

**\*SDG:4- Quality Education**

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **INTRODUCTION** | |
| 1.1 | Internet Basic | 1 |
| 1.2 | Introduction to HTML | 1 |
| 1.3 | List,Creating Table | 1 |
| 1.4 | Linking document , Frames ,Graphics to HTML Doc ,Style sheet,Style sheet basic | 2 |
| 1.5 | Add style to document ,Creating Style sheet rules ,Style sheet properties ,Font - Text - List | 2 |
| 1.6 | Color and background color - Box , Display properties. | 2 |
| **2** | **JAVASCRIPT** | |
| 2.1 | Introduction to Javascript | 1 |
| 2.2 | Advantage of Javascript | 1 |
| 2.3 | Javascript Syntax | 1 |

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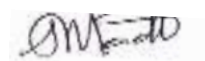| 2.4 | Datatype - Variable , Array | 1 |
|---|---|---|
| 2.5 | Operator and Expression | 1 |
| 2.6 | Looping Constructor | 1 |
| 2.7 | Function | 1 |
| 2.8 | Dialog box | 1 |
| 2.9 | Events | 1 |
| **3** | **XML and JDBC** | |
| 3.1 | Features of XML, The XML Declaration,Element Tags,Statement | 1 |
| 3.2 | Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD) | 2 |
| 3.3 | XML Schema-Introduction,JDBC Architecture,Types of Drivers | 2 |
| 3.4 | Result Set-Prepared Statement | 1 |
| 3.5 | Connection Modes | 2 |
| 3.6 | SavePoint, Batch Updations-Callable Statement | 1 |
| **4** | **JSP AND Angular JS** | |
| 4.1 | JSP LifeCycle | 1 |
| 4.2 | JSP Directives | 1 |
| 4.3 | Jsp Scripting Elements | 1 |
| 4.4 | Introduction to Angular JS | 1 |
| 4.5 | HTML and Bootstrap CSS Primer | 1 |
| 4.6 | JavaScript Primer - Single Page Application–MVC Architecture | 1 |
| 4.7 | First Application of AngularJS | 1 |
| 4.8 | Template Directives – Elements – Events. | 2 |
| **5** | **Applications** | |
| 5.1 | E-Business Models | 2 |
| 5.2 | Building an e-Business | 1 |
| 5.3 | E-Marketing | 2 |
| 5.4 | Database connectivity ,Online Payments | 1 |
| 5.5 | Security | 1 |
| 5.6 | XML and e-Commerce , m-Business. | 2 |
| | **Total** | 45 |

## Course Designers

1. Ms.J.Mythili    -    mythili@ksrct.ac.in

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| 60 AM 6P1 | Data and Visual Analytics in AI Laboratory | Category | L | T | P | Credit |
|-----------|---------------------------------------------|----------|---|---|---|--------|
|           |                                             | PC       | 0 | 0 | 2 | 2      |

## Objective

- To understand techniques and algorithms for creating effective visualizations based on principles from graphic design.
- To several industry-standard software tools to create a compelling and interactive visualization of various types of data.

## Prerequisite

Basic knowledge of Artificial Intelligence

## CourseOutcomes

Onthesuccessful completion ofthecourse,students will beable to

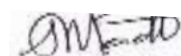| CO 1 | Understand the key techniques and theory used in visualization, including data models, graphical perception, and techniques for visual | Understand |
|------|------|------|
| CO 2 | Understand graphics pipeline and graphical perception | Understand |
| CO 3 | Create the graphical design and heatmap | Create |
| CO 4 | Analyze multidimensional data | Analyze |
| CO 5 | Apply graph visualization and navigation | Apply |

## MappingwithProgrammeOutcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 1 |   | 3 | 2 |   | 1 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 3 | 2 |   |   |   | 2 | 1 |   | 2 | 2 |
| CO3 | 3 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 1 |   | 2 | 1 |
| CO4 | 1 | 1 | 2 | 2 | 3 |   |   |   |   |   |   |   | 3 | 3 |
| CO5 | 2 | 2 | 3 | 3 | 3 | 2 |   |   |   |   |   |   | 3 | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|
| 60 AM 6P1– Data and Visual Analytics in AI Laboratory | | | | | | | |
| AIML | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |

1. Case Study on Data Analytics and its Frameworks.
2. Study on python as a data analytics tool and installation of python and anaconda
3. Study on R as a data analytics tool.
4. Study on  MATLAB as a data analytics tool
5. Install MongoDB on Windows
6. Draw a line in a diagram from position (10,100) to position (100,1000)
7. Draw a BAR diagram from position ("A", "B", "C", "D") to position [3, 8, 1, 10]
8. Draw a PIE diagram from position (35, 25, 25, 15) .
9. Draw a Scatter Plot Didram.
10. Draw a Histogram Plot Didram with the help of Python

## CourseDesigners

1. Mr.P.Thangamariappan  - thangamariappan@ksrct.ac.in

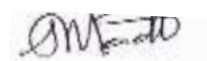| 60 AM 6P2 | DEEP LEARNING LABORATORY | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PC | 0 | 0 | 2 | 2 |

## Objective

- To introduce the fundamentals of deep learning and the main research activities in this field.
- To learn architectures and optimization methods for deep neural network training..
- To Apply Dimensionality Reduction Techniques:
- To understand their impact on the convergence and efficiency of neural network training.
- To implement Deep Learning Models
- To become proficiency in implementing Neural Network Applications

## Prerequisite

Basic knowledge of Artificial Intelligence

**Course Outcomes**

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

| | | |
|---|---|---|
| CO1 | Apply MLP, Feed Forward Neural Networks with Sigmoid Neurons, and Backpropagation in deep learning frameworksinteraction | Apply |
| CO2 | Investigate the impact of activation functions (sigmoid, tanh, ReLU) in MLPs and influence of hyperparameters on reconstruction accuracy and model generalization | Apply |
| CO3 | Analyze the impact of regularization techniques on auto-encoder models | Apply |
| CO4 | Implement, apply and test relevant learning algorithms in TensorFlow | Apply |
| CO5 | Evaluate the method's applicability in new contexts and construct new applications | Apply |

**Mapping with Programme Outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | | | 3 | 3 | 2 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | | | 3 | 3 | 2 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 3 | | | | 3 | 3 | 2 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | 3 |
| 3- Strong; 2-Medium; 1-Low | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| **60 AM 6P2– Deep Learning Laboratory** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours / Week | | | Total hrs. | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 0 | 0 | 4 | 60 | 2 | 60 | 40 | 100 |
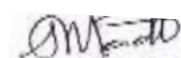
1. Implement a basic MLP model using a deep learning framework.
2. Construct a Feed Forward Neural Network (FFNN) using Sigmoid Neurons.
3. Implement Backpropagation to train a simple neural network.
4. Investigate the impact of activation functions including sigmoid, tanh, and ReLU on MLPs.
5. Evaluate the impact of each hyperparameter on reconstruction accuracy and model generalization
6. Implement a sparse auto-encoder architecture using a deep learning framework using TensorFlow or PyTorch.
7. Implement and analyze the impact of various regularization techniques on auto-encoder models.
8. Implementation of Convolution Neural Network in Python using TensorFlow.

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9. Implementation of Long Short-Term Memory (LSTM) in Python using TensorFlow.
10. **Mini Project work involving the application of Deep Learning**

*SDG 8 - sustainable economic growth, full and productive employment

**Course Designers**

Dr. P. KALADEVI          - kaladevi@ksrct.ac.in

| 60 AM E11 | Solve Business Problems with AI | Category | L | T | P | Credit |
|-----------|-------------------------------|----------|---|---|---|--------|
|           |                               | PE | 3 | 0 | 0 | 3 |

**Objective(s):**

- The students will be able to relate with the practical uses of AI in day-to-day businesses.
- They will be able to understand the cautions need to be observed while working with AI.
- They will also be able to apply AI to boost business productivity

**Prerequisite:**

NIL

**Course Outcomes:**

**At the end of the course, the student will be able to**

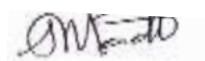| CO1 | Analyze practical uses of AI in day-to-day businesses | Understand, Analyze |
|-----|-------------------------------------------------------|---------------------|
| CO2 | Understand the cautions need to be observed while working with AI | Remember, Understand, Analyze, Apply |
| CO3 | Apply AI to boost business productivity | Understand, Analyze, Apply, Evaluate |
| CO4 | Use various cloud platforms | Understand, Analyze, Apply |
| CO5 | Understand data privacy | Understand, Analyze |

**Mapping with Programme Outcomes:**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|

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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 2 | | 2 | 2 | 2 | 2 | | | | 2 | | |
| 2 | 2 | 3 | 2 | | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 |
| 3 | 2 | 3 | 3 | | 2 | 2 | 2 | 2 | | | | 2 | | |
| 4 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 |
| 5 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 |

**Assessment Pattern:**
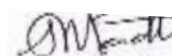
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | **1** | **2** | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E11 – Solve Business Problems with AI** | | | | | | | | |
| AIML | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| **Introduction** | |
|---|---|
| AI for businesses, optimizing business processes, Minimizing costs, AI solutions: Deep Q-learning, Action selection policies. | **[9]** |
| **Apply AI and ML to business problems*** | |
| Solve Business Problems with AI and Machine Learning Course Introduction, Identify Data-Driven Emerging Technologies Module Introduction, The Data Hierarchy, Big Data, Data Mining, Applied AI and ML in Business, Appropriate Business Problems, Challenges of AI/ML, Machine Learning Model, Machine Learning Workflow, Concept Drift and Transfer Learning, Problem Formulation, Differences Between Traditional Programming and Machine Learning, Differences Between Supervised and Unsupervised Learning, Randomness and Uncertainty, Machine Learning Outcomes | **[9]** |
| **How to choose the right tool?** | |
| Importance of choosing the right tools, Hardware requirements: Parallel processors, GPUs, GPU platforms; Cloud Platforms: cloud hosting services: Amazon Web Services, Microsoft Azure, Google TPUs; Open-source AI tools, Proprietary AI tools | **[9]** |

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| Data privacy and Ethical Practices* | |
|---|---|
| Introduction, Data Protection, Data Privacy Laws, Privacy by Design, Data Privacy Principles at Odds with Machine Learning, Compliance with Data Privacy Laws and Standards, Data Sharing and Privacy, The Big Data Challenge, Preconceived Notions, The Black Box Challenge, Bias, Prejudice, and Discrimination, Ethics in NLP, Use of Data for Unintended Purposes, Intellectual Property, Humanitarian Principles, Asilomar AI Principles | **[9]** |
| **Case Studies** | |
| Marketing and Sales- Healthcare- E-commerce- Agriculture- Logistics- Game and Entertainment- Insurance- Manufacturing- Sport and wellness | **[9]** |
| **Total Hours** | **45** |

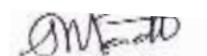| Text book(s): | |
|---|---|
| 1. | M.C. Trivedi, "A Classical Approach to Artificial Intelligence", Khanna Book Publishing. |
| 2. | Artificial Intelligence in Practice by Bernard Marr, Matt Ward, O'Reilly, 2019. |
| **Reference(s):** | |
| 1. | Artificial Intelligence and Machine Learning for Business: A No-Nonsense Guide to Data-Driven Technologies by Steven Finlay, Relativistic publishers, 2017. |
| 2. | https://www.coursera.org/learn/solve-problems-ai-machine-learning. |

*SDG: 4- Quality Education

**Course Contents and Lecture Schedule:**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction** | |
| 1.1 | AI for businesses | 2 |
| 1.2 | Optimizing business processes | 2 |
| 1.3 | Minimizing costs | 1 |
| 1.4 | AI solutions: Deep Q-learning | 2 |
| 1.5 | Action selection policies | 2 |
| 2 | **Apply AI and ML to business problems** | |
| 2.1 | Solve Business Problems with AI and Machine Learning Course Introduction | 1 |

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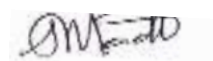
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| 2.2 | Identify Data-Driven Emerging Technologies Module Introduction | 1 |
|---|---|---|
| 2.3 | The Data Hierarchy, Big Data, Data Mining, Applied AI and ML in Business, Appropriate Business Problems | 1 |
| 2.4 | Challenges of AI/ML, Machine Learning Model, Machine Learning Workflow | 1 |
| 2.5 | Concept Drift and Transfer Learning, Problem Formulation, Differences Between Traditional Programming and Machine Learning | 2 |
| 2.6 | Differences Between Supervised and Unsupervised Learning | 1 |
| 2.7 | Randomness and Uncertainty | 1 |
| 2.8 | Machine Learning Outcomes | 1 |
| **3** | **How to choose the right tool?** | |
| 3.1 | Importance of choosing the right tools | 1 |
| 3.2 | Hardware requirements: Parallel processors, GPUs, GPU platforms | 2 |
| 3.3 | Cloud Platforms | 1 |
| 3.4 | cloud hosting services: Amazon Web Services, Microsoft Azure, Google TPUs | 3 |
| 3.5 | Open-source AI tools | 1 |
| 3.6 | Proprietary AI tools | 1 |
| **4** | **Data privacy and Ethical Practices** | |
| 4.1 | Introduction, Data Protection | 1 |
| 4.2 | Data Privacy Laws, Privacy by Design | 1 |
| 4.3 | Data Privacy Principles at Odds with Machine Learning, Compliance with Data Privacy Laws and Standards | 2 |
| 4.4 | Data Sharing and Privacy, The Big Data Challenge, Preconceived Notions | 1 |
| 4.5 | The Black Box Challenge, Bias, Prejudice, and Discrimination | 1 |
| 4.6 | Ethics in NLP, Use of Data for Unintended Purposes, Intellectual Property | 2 |
| 4.7 | Humanitarian Principles, Asilomar AI Principles | 1 |
| **5** | **Case Studies** | |
| 5.1 | Marketing and Sales | 1 |
| 5.2 | Healthcare | 1 |
| 5.3 | E-commerce | 1 |

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| 5.4 | Agriculture | 1 |
|------|-------------|---|
| 5.5. | Logistics | 1 |
| 5.6 | Game and Entertainment | 1 |
| 5.7 | Insurance | 1 |
| 5.8 | Manufacturing | 1 |
| 5.9 | Sport and wellness | 1 |
| | **Total** | 45 |

## Course Designers:

1. Ms.B.Janani **-** janani@ksrct.ac.in

| 60 AM E12 | **Big Data Analytics** | Category | L | T | P | Credit |
|-----------|------------------------|----------|---|---|---|--------|
| | | PE | 3 | 0 | 0 | 3 |

### Objective
- Understand the fundamentals of big data analytics and statistics.
- Interpret data analysis and data analytic methods using R.
- Gain knowledge on frequent item set and clustering.
- Learn to mine data streams
- Understand the different tools to handle big data with visualization.
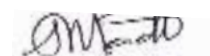
### Prerequisite
Data Mining

### CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand the concepts of big data analytics and statistical distribution techniques | Remember, Understand, Analyze |
|------|---------------------------------------------------------------------------------------|-------------------------------|
| CO2 | Interpret the knowledge of data analysis and data analytic methods using R. | Remember, Apply, Analyze |
| CO3 | Understand the usage of frequent item set and clustering techniques. | Remember, Understand, Apply Analyze |
| CO4 | Describe the ways to mine the data streams. | Remember, Understand, Apply |
| CO5 | Interpret the knowledge of hadoop tool and NoSQL. | Remember, Apply |

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## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | | 2 | | |
| 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | | 2 | | |
| 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | 3 | | 2 |

## Assessment Pattern
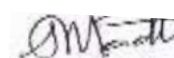
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------------------|------|------|------|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E12– Big Data Analytics** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction to big data**

Introduction to Big Data Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error **[9]**

**Basic data analysis and data analytic methods using R**

Regression Modelling, Multivariate Analysis, Bayesian Modelling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks: Learning and Generalization, Competitive Learning, Principal Component Analysis and Neural Networks, Fuzzy Logic: Extracting Fuzzy Models from Data Fuzzy Decision Trees, Stochastic Search Methods. Introduction to R, Statistics for Model Building and Evaluation **[9]**

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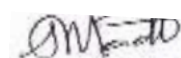
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| | |
|---|---|
| **Frequent item sets and clustering**<br>Mining Frequent item sets: Market Based Model, Apriori Algorithm, Handling Large Data Sets in Main Memory, Limited Pass Algorithm, Counting Frequent item sets in a Stream, Clustering Techniques: Hierarchical, K-Means, Frequent Pattern based Clustering Methods. | **[9]** |
| **Mining data streams**<br>Introduction to Streams Concepts: Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream: Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) Applications, Case Studies, Real Time Sentiment Analysis, Stock Market Predictions. | **[9]** |
| **Framework, technologies, tools and visualization**<br>Map Reduce: Hadoop, Hive, MapR, Sharding, NoSQL Databases: S3, Hadoop Distributed File Systems, Visualizations: Visual Data Analysis Techniques, Interaction Techniques; Systems and Analytics Applications, Analytics using Statistical packages, Industry challenges and application of Analytics Hands On:<br>1. Implementing sampling distribution in R<br>2. Implement regression in R<br>3. Implementing neural networks in R Or Mat lab<br>4. Write a program to implement apriori algorithim in R.<br>5. Implementation of Bays algorithm in R.<br>6. Implementation of K-Means algorithm in R<br>7. Write the program to count distinct elements in streams<br>8. To implement SVM Or Decision Tree classifier in R.<br>9. Write a map reduce program to count frequency of word occurrence in given text file.<br>10. Design a map reduce programme to implement inverted indexing.<br>11. Implementation of Mongo db. | **[9]** |
| **Total Hours** | **45** |

| | **Text book(s):** |
|---|---|
| 1. | Bart Baesens, "Analytics in a Big Data World: The Essential Guide to data Science and its Applications", Wiley publications, 2014. |
| 2. | Subhashini chellapan Seema Acharya, Big Data and Analytics, WILEY Pub, 2ed, Jan 2019. |
| 3. | Rajkamal and Preethi saxena, Big Data Analytics, MGH, Feb 2019. |
| 4. | Jeeva Jose, Beginner's Guide for Data Analysis using R Programming, Khanna Book Publishing House, 2019. |

| | **Reference(s):** |
|---|---|
| 1. | Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2003. |
| 2. | AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2020. |
| 3. | Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley, 2012. |

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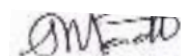| 4. | Glenn J. Myatt, "Making Sense of Data", Wiley, 2006. |
|---|---|

**\*SDG:9 - Industry Innovation and Infrastructure**

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Problem Solving** | |
| 1.1 | Introduction – What is Big data, Important V's of big data and traits of big data | 2 |
| 1.2 | Analysis vs Reporting | 1 |
| 1.3 | Challenges of Conventional Systems and Web Data | 2 |
| 1.4 | Evolution of Analytic Scalability | 1 |
| 1.5 | Statistical Concepts: Sampling Distributions, Re-Sampling | 1 |
| 1.6 | Statistical Inference, Prediction Error | 2 |
| **2** | **Basic data analysis and data analytic methods using R** | |
| 2.1 | Regression Modelling and Multivariate Analysis | 2 |
| 2.2 | Bayesian Modelling, Inference and Bayesian Networks | 1 |
| 2.3 | Support Vector and Kernel Methods | 1 |
| 2.4 | Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics | 1 |
| 2.5 | Neural Networks: Learning and Generalization | 1 |
| 2.6 | Principal Component Analysis and Stochastic Search Methods | 1 |
| 2.7 | Fuzzy Logic: Extracting Fuzzy Models from Data Fuzzy Decision Trees | 1 |
| 2.8 | Introduction to R, Statistics for Model Building and Evaluation | 1 |
| **3** | **Frequent item sets and clustering** | |
| 3.1 | Mining Frequent item sets: Market Based Model | 1 |
| 3.2 | Apriori Algorithm | 1 |
| 3.3 | Large Data Sets in Main Memory | 1 |
| 3.4 | Limited Pass Algorithm | 1 |
| 3.5 | Counting Frequent item sets in a Stream | 1 |
| 3.6 | Clustering Techniques'- K-Means | 2 |

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| 3.7 | Hierarchical Clustering Methods | 1 |
|------|--------------------------------|---|
| 3.8 | Frequent Pattern based Clustering Methods | 1 |
| **4** | **Mining data streams** | |
| 4.1 | Stream Data Model and Architecture and Stream Computing | 1 |
| 4.2 | Sampling Data in a Stream: Filtering Streams, Counting Distinct Elements in a Stream | 2 |
| 4.3 | Sampling Data in a Stream: Estimating Moments, Counting Oneness in a Window, Decaying Window | 1 |
| 4.4 | Real time Analytics Platform (RTAP) Applications | 1 |
| 4.5 | Case Studies - Real Time Sentiment Analysis | 2 |
| 4.6 | Case Studies  - Stock Market Predictions | 2 |
| **5** | **Framework, technologies, tools and visualization** | |
| 5.1 | Map Reduce: Hadoop | 1 |
| 5.2 | Hive | 1 |
| 5.3 | MapR and Sharding | 1 |
| 5.4 | NoSQL Databases : S3 | 1 |
| 5.5. | Hadoop Distributed File Systems | 1 |
| 5.6. | Visual Data Analysis Techniques | 2 |
| 5.7. | Analytics using Statistical packages | 1 |
| 5.8. | Industry challenges and application of Analytics | 1 |
| | **Total** | 45 |

## CourseDesigners

1.Dr A Gnanabaskaran     -gnanabaskarana@ksrct.ac.in

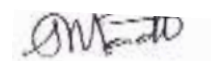| 60 AM E13 | **Statistical Thinking for Data Science** | Category | L | T | P | Credit |
|-----------|-------------------------------------------|----------|---|---|---|--------|
| | | PE | 3 | 0 | 0 | 3 |

### Objective
- To learn  the concept of data science.
- To understand  the concept statistical thinking in collecting data.
-  To apply statistical thinking in various Models.
- To understand the goals ofData Analysis and Visualization models.

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- To apply the knowledge of Bayesian Modelling in various applications

**Prerequisite**

NIL

**Course Outcomes**

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

| | | |
|---|---|---|
| CO1 | Understand the statistical foundation for data science | Remember, Understand, Analyze |
| CO2 | Apply statistical thinking in collecting, modelling and analyzing data | Remember, Apply |
| CO3 | Ability to visualize all types of data | Remember, Understand, Analyze |
| CO4 | Understand how to use R for different types of data | Remember, Understand, Apply |
| CO5 | Apply statistical thinking in Bayesian Modelling | Remember, Apply, Evaluate |

**Mapping with Programme Outcomes**

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | 2 | | | | 3 | 2 | 2 | 3 | 3 | |
| CO2 | 3 | 3 | 2 | | 2 | | | 2 | 3 | 3 | 2 | 3 | 2 | 2 |
| CO3 | 2 | 3 | 3 | | 3 | | | 2 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | | | | 3 | 2 | 2 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 2 | 2 | | | | 3 | 2 | 2 | 3 | 3 | |
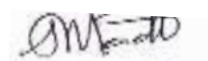
**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 10 | 10 | 20 |
| Apply (Ap) | 20 | 20 | 40 |
| Analyze (An) | 20 | 20 | 20 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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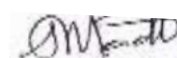Approved in Academic Council Meeting held on 23/12/23

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|---|---|---|---|---|---|---|---|
| **60 AM E13- Statistical Thinking for Data Science** | | | | | | | |
| AIML | | | | | | | |
| Semester | Hours/Week | | | Total hours | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction to Data Science** | **[9]** |
| Data acquisition, cleaning, and aggregation, Exploratory data analysis and visualization, Feature engineering, Model creation and validation | |
| **Statistical Thinking** | **[9]** |
| Examples of Statistical Thinking, Numerical Data, Summary Statistics, From Population to Sampled Data, Different Types of Biases, Introduction to Probability, Introduction to Statistical Inference | |
| **Statistical Thinking 2** | **[9]** |
| Association and Dependence, Association and Causation, Conditional Probability and Bayes Rule, Simpsons Paradox, Confounding, Introduction to Linear Regression, Special Regression Models | |
| **Exploratory Data Analysis and Visualization** | **[9]** |
| Goals of statistical graphics and data visualization, Graphs of Data, Graphs of Fitted Models, Graphs to Check Fitted Models, what makes a good graph? Principles of graphics | |
| **Introduction to Bayesian Modelling** | **[9]** |
| Bayesian inference: combining models and data in a forecasting problem, Bayesian hierarchical modelling for studying public opinion, Bayesian modelling for Big Data | |
| **Total Hours** | **45** |

**Text book(s):**

1. Tamhane, Ajit C., and Dorothy D. Dunlop. Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall, 1999.

2. Jeeva Jose, Beginner's Guide for Data Analysis using R Programming, Khanna Book Publishing House 2019.
   (ISBN 978-93-82609-131)

3. Allen B. Downey,"Think Stats: Exploratory Data Analysis, Second Edition Paperback – 1 November 2014

**Reference(s):**

1. V.K. Jain, Data Sciences & Analytics, Khanna Book Publishing House 2021.

2. Practical Statistics for Data Scientists by Peter Bruce and Andrew Bruce, O'Reilly, 2017

3. Statistics in Plain English by Timothy C. Urdan, Routledge, 2010

4. https://www.mooc-list.com/course/statistical-thinking-data-science-and-analytics-edx

5. Allen B. Downey,"Think Stats 2e: Exploratory Data Analysis "Paperback – 28 October 2014

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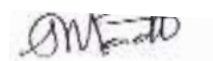Approved in Academic Council Meeting held on 23/12/23

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**Course Contents and Lecture Schedule**

| S.No. | Topic | No. of Hours |
|---|---|---|
| 1 | **Introduction to Data Science** | |
| 1.1 | Introduction to data, data science and data Engineering | 1 |
| 1.2 | Data acquisition | 1 |
| 1.3 | Data cleaning and aggregation | 2 |
| 1.4 | Exploratory data analysis and visualization | 2 |
| 1.5 | Feature engineering | 1 |
| 1.6 | Model creation and validation | 2 |
| 2 | **Statistical Thinking** | |
| 2.1 | Statistical Thinking, Examples of Statistical Thinking | 1 |
| 2.2 | Numerical Data | 1 |
| 2.3 | Summary Statistics | 1 |
| 2.4 | From Population to Sampled Data | 1 |
| 2.5 | Different Types of Biases, | 1 |
| 2.6 | Introduction to Probability | 2 |
| 2.7 | Introduction to Statistical Inference | 2 |
| 3 | **Statistical Thinking 2** | |
| 3.1 | Association and Dependence | 2 |
| 3.2 | Association and Causation | 2 |
| 3.3 | Conditional Probability and Bayes Rule | 2 |
| 3.4 | Simpsons Paradox, Confounding | 1 |
| 3.5 | Introduction to Linear Regression | 1 |
| 3.6 | Special Regression Models | 1 |
| 4 | **Exploratory Data Analysis and Visualization** | |
| 4.1 | Data Analysis and Visualization | 1 |
| 4.2 | Goals of statistical graphics and data visualization | 1 |
| 4.3 | Graphs of Data | 1 |
| 4.4 | Graphs of Fitted Models | 2 |
| 4.5 | Graphs to Check Fitted Models | 2 |
| 4.6 | What makes a good graph? | 1 |

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| 4.7 | Principles of graphics | 1 |
|---|---|---|
| **5** | **Introduction to Bayesian Modelling** | |
| 5.1 | Introduction to Bayesian Modelling | 1 |
| 5.2 | Bayesian inference: combining models and data in a forecasting problem | 2 |
| 5.3 | Bayesian hierarchical modelling for studying public opinion | 2 |
| 5.4 | Big Data, Types of Digital data and its application | 2 |
| 5.5 | Bayesian modelling for Big Data | 2 |
| | **Total** | 45 |

## Course Designers

1. Dr. K.Kiruthika    -   kiruthika@ksrct.ac.in
2. Ms. V.Thivya        -   thivya@ksrct.ac.in

| 60 AM E14 | **OPTIMIZATION TECHNIQUES IN MACHINE LEARNING** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

## Objective

- The students will be able to understand and analyze how to deal with changing data.
- To identify and interpret potential unintended effects in your project.
- To understand and define procedures to operationalize and maintain your applied machine learning model.
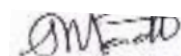
## Prerequisite
NIL

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

| CO1 | Understand and analyze how to deal with changing data. | Understand |
|---|---|---|
| CO2 | Understand and interpret potential unintended effects in their project. | Understand |
| CO3 | Understand and define procedures to operationalize and maintain the applied machine learning model. | Analyze |
| CO4 | Understand how to optimize the use of Machine Learning in real-life problems. | Analyze |
| CO5 | Understand the applications of GA & GP | Apply |

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## Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-----|-----|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 1 | 1 | 2 | 2 |
| CO4 | 3 | 2 | 1 | 1 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 2 | 2 | 3 |

## Assessment Pattern
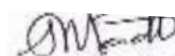
| Bloom'sCategory | ContinuousAssessmentTests (Marks) | | End Sem Examination (Marks) |
|-----------------|-----|-----|-----|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 20 |
| Understand (Un) | 20 | 20 | 40 |
| Apply (Ap) | 10 | 10 | 20 |
| Analyze (An) | 20 | 20 | 20 |
| Evaluate (Ev) | - | - | - |
| Create (Cr) | - | - | - |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E14** - Optimization Techniques in Machine Learning | | | | | | | | |
| AIML | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | MaximumMarks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction**<br>What is optimization, Formulation of LPP, Solution of LPP: Simplex method, Basic Calculus for optimization: Limits and multivariate functions, Derivatives and linear approximations: Single variate functions and multivariate functions. | **[9]** |
| **Machine Learning Strategy**<br>ML readiness, Risk mitigation, Experimental mindset, Build/buy/partner, Setting up a team, Understanding and communicating change. | **[9]** |
| **Responsible Machine Learning**<br>AI for good and all, Positive feedback loops and negative feedback loops, Metric design and observing behaviours, Secondary effects of optimization, Regulatory concerns | **[9]** |
| **Machine Learning in production and planning**<br>Integrating info systems, users break things, time and space complexity in production, when to retain the model? Logging ML model versioning, Knowledge transfer, Reporting performance to stakeholders. | **[9]** |

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| | Applications | [9] |
|---|---|---|
| | Applications of GA & GP, Hybrid systems | |
| | **Total Hours** | **45** |

**Textbook(s):**

1. Jeeva Jose, Introduction to Machine Learning, Khanna Book Publishing 2020.

2. Rajiv Chopra, Machine Learning, Khanna Book Publishing 2021.

**Reference(s):**

1. Optimization for Machine Learning, SuvritSra, Sebastian Nowozin and Stephen J. Wright, MIT Press, 2011.

2. Optimization in Machine Learning and Applications, Suresh Chandra Satapathy, Anand J. Kulkarni, Springer, 2019.
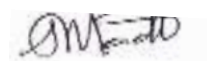
**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | Introduction: Optimization | 1 |
| 1.2 | Formulation of LPP | 1 |
| 1.3 | Solution of LPP: Simplex method | 1 |
| 1.4 | Basic Calculus for optimization: Limits and multivariate functions | 2 |
| 1.5 | Derivatives and linear approximations | 1 |
| 1.6 | Single Variate functions | 1 |
| 1.7 | Multivariate functions | 2 |
| **2** | **Machine Learning Strategy** | |
| 2.1 | ML readiness | 1 |

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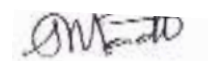| 2.2 | Risk mitigation | 1 |
|---|---|---|
| 2.3 | Experimental mindset | 1 |
| 2.4 | Build/buy/partner | 1 |
| 2.5 | Setting up a team | 1 |
| 2.6 | Understanding changes | 2 |
| 2.7 | Communicating changes | 1 |
| 2.8 | Overall Discusion on Machine Learning Strategy | 1 |
| 3 | **Responsible Machine Learning** | |
| 3.1 | AI for good and all | 2 |
| 3.2 | Positive feedback loops | 1 |
| 3.3 | Negative feedback loops | 1 |
| 3.4 | Metric design | 1 |
| 3.5 | Observing behaviours | 1 |
| 3.6 | Secondary effects of optimization | 1 |
| 3.7 | Regulatory concerns | 1 |
| 3.8 | Discussion on responsible Machine Learning | 1 |
| **4** | **Machine Learning in production and planning** | |
| 4.1 | Integrating info systems | 2 |
| 4.2 | Users break things | 1 |
| 4.3 | Time and space complexity in production | 1 |
| 4.4 | When to retain the model? | 1 |
| 4.5 | Logging ML model versioning | 1 |
| 4.6 | Knowledge transfer | 1 |
| 4.7 | Reporting performance to stakeholders | 1 |
| 4.8 | Machine Learning in Planning | 1 |
| **5** | **Applications** | |
| 5.1 | Applications of GA | 3 |
| 5.2 | Applications of GP | 3 |
| 5.3 | Hybrid systems | 3 |
| | **Total** | 45 |

## Course Designers

M. Varshana Devi – varshanadevi@ksrct.ac.in

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| 60 AM E15 | INTERNET OF THINGS | Category | L | T | P | Credit |
|-----------|-------------------|----------|---|---|---|--------|
|           |                   | PE | 3 | 0 | 0 | 3 |

## Objective

- o   To Understand the Smart Objects and IoT Architectures.
- o   To Build the simple IoT Systems using Arduino and Raspberry Pi.
- o   To Learn about various IOT-related Communication protocols.
- o   To Develop the IoT infrastructure for popular applications.
- o   To Design and develop real time IoT enabled applications

## Prerequisite

NIL

## CourseOutcomes

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

| CO1 | Understand basic premise of an IOT System. | Remember,Understand, Analyze |
|-----|---------------------------------------------|------------------------------|
| CO2 | Apply the functionality of IoT Systems using Arduino and Raspberry Pi. | Remember, Apply, Analyze |
| CO3 | Understand the front-end hardware platforms and communication protocols for IoT | Remember,Understand, Apply, Analyze |
| CO4 | Understand IoT Applications, data analysis and management. | Remember,Understand, Apply |
| CO5 | Evaluate the real time IoT enabled applications. | Remember, Apply, Evaluate |

## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 3 | 3 | 3 | 2 |   |   |   |   | 3 | 3 |   | 3 |
| 2 | 3 | 3 | 3 | 3 | 3 | 3 |   |   |   |   | 2 | 3 |   | 3 |
| 3 | 3 | 2 | 3 | 3 | 3 | 2 |   | 2 |   |   | 3 | 3 |   | 3 |
| 4 | 3 | 2 | 2 | 3 | 3 | 3 |   |   |   | 2 | 3 | 3 |   | 3 |
| 5 | 3 | 3 | 3 | 3 | 3 | 2 |   |   | 3 |   | 3 | 3 |   | 3 |
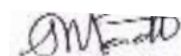
## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------------------|-----|-----|-----|
|                  | 1   | 2   |     |
| Remember (Re) | 10 | 10 | 10 |

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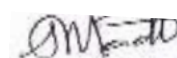
| | | | |
|---|---|---|---|
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 10 | 30 |
| Evaluate (Ev) | 0 | 10 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 60 AM E15– Internet of Things | | | | | | | | |
| B.E(**Artificial Intelligence Machine Learning**) | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction to IoT:** What is IoT, how does it work? Difference between Embedded device and IoT device, Properties of IoT device, IoT Ecosystem, IoT Decision Framework, IoT Solution Architecture Models, Major IoT Boards in Market. | **[9]** |
| **Setting Up Raspberry/Arduino to Create Solutions: Explore Raspberry Pi, setting up Raspberry Pi, showing working of Raspberry Pi using SSH Client and Team Viewer, Understand Sensing actions, Understand Actuators and MEMS** | **[9]** |
| **Communication Protocols used in IoT:** Types of wireless communication, Major wireless Short-range communication devices, properties, comparison of these devices (Bluetooth, WIFI, ZigBee, 6LoWPAN), Major wireless Long-range communication devices, properties, comparison of these devices (Cellular IoT, LPWAN) | **[9]** |
| **IoT Applications: Industrial Internet 4.0, Applications such as: Smart home, wearables, smart city, smart grid, connected car, connected health (digital health, telehealth, telemedicine), smart retail.** | **[9]** |
| **Sensors: Applications of various sensors: Google Maps, Waze, WhatsApp, Ola Positioning sensors: encoders and accelerometers, Image sensors: cameras, Global positioning sensors: GPS, GLONASS, IRNSS, Galileo and indoor localization systems, Motion & Orientation Sensors: Accelerometer, Magnetometer, Proximity Sensor, Gyroscope Calibration, noise modeling and characterization and noise filtering and sensor data processing. Privacy &Security.** | **[9]** |
| **Total Hours** | **45** |

**Text book(s):**

| | |
|---|---|
| 1. | S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Education,2009. |
| 2. | Melanie Mitchell," Artificial Intelligence: A Guide for Thinking Humans", Farrar, Straus and Giroux Publisher,2019 |

**Reference(s):**

| | |
|---|---|
| 1. | CunoPfister, Getting Started with the Internet of Things, O Reilly Media, 2011 |
| 2. | Kyung, C.-M., Yasuura, H., Liu, Y., Lin, Y.-L., Smart Sensors and Systems, Springer International Publishing, 2015 |

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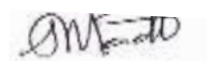**\*SDG:7- Ensure access to affordable, reliable, sustainable and modern energy for all.**

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction to IoT** | |
| 1.1 | Introduction – What is IoT, how does it work? | 2 |
| 1.2 | Difference between Embedded device and IoT device. | 1 |
| 1.3 | Properties of IoT device. | 2 |
| 1.4 | IoT Ecosystem, IoT Decision Framework. | 1 |
| 1.5 | IoT Solution Architecture Models. | 1 |
| 1.6 | Major IoT Boards in Market. | 2 |
| 2 | **Setting Up Raspberry/Arduino to Create Solutions** | |
| 2.1 | Explore Raspberry Pi. | 1 |
| 2.2 | setting up Raspberry Pi. | 2 |
| 2.3 | showing working of Raspberry Pi using SSH Client and Team Viewer. | 2 |
| 2.4 | Understand Sensing actions. | 2 |
| 2.5 | Understand Actuators and MEMS. | 2 |
| 3 | **Communication Protocols used in IoT** | |
| 3.1 | Types of wireless communication | 1 |
| 3.2 | Major wireless Short-range communication devices. | 2 |
| 3.3 | properties,comparison of these devices (Bluetooth,WIFI, ZigBee, 6LoWPAN). | 2 |
| 3.4 | Major wireless Long-range communication devices | 2 |
| 3.5 | Properties, comparison of these devices (Cellular IoT, LPWAN) | 2 |

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| 4 | **IoT Applications** | |
|---|---|---|
| 4.1 | Industrial Internet 4.0. | 1 |
| 4.2 | Applications such as: Smart home. | 2 |
| 4.3 | Wearables smart city, smart grid. | 2 |
| 4.4 | connected car, connected health (digital health, telehealth, telemedicine). | 2 |
| 4.5 | smart retail. | 2 |
| 5 | **Sensors** | |
| 5.1 | Applications of various sensors: Google Maps Waze, WhatsApp | 1 |
| 5.2 | Ola Positioning sensors: encoders and Accelerometers. | 1 |
| 5.3 | Image sensors: cameras, Global positioning sensors: GPS, GLONASS, IRNSS, Galileo and indoor localization systems. | 2 |
| 5.4 | Motion & Orientation Sensors: Accelerometer, Magnetometer. | 2 |
| 5.5. | Proximity Sensor, Gyroscope Calibration. | 1 |
| 5.6. | Noise modeling and characterization and noise filtering and sensor data processing. Privacy &Security. | 2 |
| | **Total** | 45 |

## Course Designers

1.Mr.P.Sathishkumar -sathishkumar@ksrct.ac.in

| **60 AM E16** | **Generative AI** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

## Objective
- To get an introduction to Generative AI
- To learn the language models and LLM architectures of generative AI
- To understand the Generative Pre-trained Transformer
- To work with LangChain framework
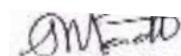- To learn about prompt engineering

## Prerequisite
NIL

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

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| | | |
|------|------|------|
| CO1 | Understanding the basic concepts of AI, its applications, ethical considerations, and the ability to use AI tools. | Understand, Analyze, Apply |
| CO2 | Understand generative AI deeply, including its historical development. | Understand, Apply Analyze |
| CO3 | It can enhance the learning experience or provide valuable insights. | Remember, Understand, Apply Analyze |
| CO4 | Identify problems where artificial intelligence techniques are applicable | Understand, Apply, Analyze |
| CO5 | Learning outcomes are statements of the knowledge, skills and abilities individual students should possess and can demonstrate upon completion of a learning experience or sequence of learning experiences. | Understand, Apply, Analyze |

**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 2 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 3 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 4 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |
| 5 | 3 | 2 | 3 | | 3 | | | | 3 | 3 | 2 | 3 | 3 | |

**Assessment Pattern**

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------------------|:-----:|:-----:|:-----:|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 40 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

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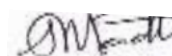Approved in Academic Council Meeting held on 23/12/23

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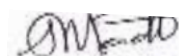
| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM E16–Generative AI** | | | | | | | | |
| B.E. Artificial Intelligence and Machine Learning | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **IntroductiontoGenerative AI**<br>Introduction to Artificial Intelligence – Machine Learning -Difference between AI and Machine Learning – Deep Learning – Deep Learning Model Types - Generative AI - Definition and scope of Generative AI - Overview of generative models and their applications - Importance of Generative AI in various domains - Ethical considerations and challenges | **[8]** |
| **Generative AI:Language Models and LLM Architectures**<br>Introduction to language models and their role in AI - Traditional approaches to language modeling - Deep learning-based language models and their advantages - Overview of popular LLM architectures: RNNs, LSTMs, and Transformers | **[9]** |
| **Understanding GPT (Generative Pre-trained Transformer)***<br>Introduction to GPT and its significance - Pre-training and fine-tuning processes in GPT - Architecture and working of GPT models - Overview of GPT variants and their use cases<br>**ChatGPT: A Practical Application of GPT**<br>Introduction to ChatGPT and its purpose - Training data and techniques for ChatGPT - Handling user queries and generating responses - Tips for improving ChatGPT's performance | **[10]** |
| **LangChain: Simplifying Development with Language Models**<br>Introduction to LangChain and its objectives - Overview of the LangChain framework and its components - Streamlining application development using LangChain - Examples of applications built with LangChain | **[9]** |
| **Prompt Engineering: Enhancing Model Outputs***<br>Understanding the concept and significance of prompt engineering - Strategies for designing effective prompts - Techniques for controlling model behavior and output quality - Best practices for prompt engineering in generative AI. | **[9]** |
| **Total Hours** | **45** |

**Text Book(s):**

| | |
|---|---|
| 1. | Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", Illustrated edition, The MIT Press, 2016. |
| 2. | Alger Fraley, "The Artificial Intelligence and Generative AI Bible", AlgoRay Publishing, 2023. |

**Reference(s):**

| | |
|---|---|
| 1. | David Foster, "Generative Deep Learning", O'Reilly Media, Inc, 2019 |
| 2. | Michael Negnevitsky, "Artificial Intelligence: A Guide to Intelligent Systems Paperback", 2011 |
| 3. | Jakub Langr, Vladimir Bok,"GANs in Action: Deep learning with Generative Adversarial Networks", First Edition, Manning, 2019. |
| 4. | Joseph Babcock, Raghav Bali,"Generative AI with Python and TensorFlow 2: Create images, text, and music with VAEs, GANs, LSTMs, Transformer models", Packt Publishing Limited, 2021 |

**\*SDG:9 - Innovation**

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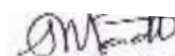
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**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **IntroductiontoGenerative AI** | |
| 1.1 | Introduction to Artificial Intelligence | 1 |
| 1.2 | Machine Learning ,Difference between AI and Machine Learning | 1 |
| 1.3 | Deep Learning ,Deep Learning Model Types | 1 |
| 1.4 | Generative AI , Definition and scope of Generative AI ,Overview of generative models and their applications | 2 |
| 1.5 | Importance of Generative AI in various domains - Ethical considerations and challenges | 2 |
| 1.6 | Ethical considerations and challenges | 1 |
| **2** | **Generative AI:Language Models and LLM Architectures** | |
| 2.1 | Introduction to language models and their role in AI | 3 |
| 2.2 | Traditional approaches to language modeling | 2 |
| 2.3 | Deep learning-based language models and their advantages | 2 |
| 2.4 | Overview of popular LLM architectures: RNNs, LSTMs, and Transformers | 2 |
| **3** | **LangChain: Simplifying Development with Language Models** | |
| 3.1 | Introduction to LangChain and its objectives | 2 |
| 3.2 | Overview of the LangChain framework and its components | 1 |
| 3.3 | Streamlining application development using LangChain | 1 |
| 3.4 | Examples of applications built with LangChain | 1 |
| 4 | **ChatGPT: A Practical Application of GPT** Introduction to ChatGPT and its purpose | 2 |
| 4.1 | Training data and techniques for ChatGPT | 1 |
| 4.2 | Handling user queries and generating responses | 1 |
| 4.3 | Tips for improving ChatGPT's performance | 1 |
| **4** | **LangChain: Simplifying Development with Language Models** | |
| 4.1 | Introduction to LangChain and its objectives | 2 |
| 4.2 | Overview of the LangChain framework and its components | 3 |
| 4.3 | Streamlining application development using LangChain | 3 |
| 4.4 | Examples of applications built with LangChain | 1 |
| **5** | **Prompt Engineering: Enhancing Model Outputs** | |
| 5.1 | Understanding the concept and significance of prompt engineering | 2 |
| 5.2 | Strategies for designing effective prompts | 3 |
| 5.3 | Techniques for controlling model behavior and output quality | 2 |

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| 5.4 | Best practices for prompt engineering in generative AI | 2 |
|---|---|---|
| | **Total** | 45 |

## CourseDesigners

1. Dr.K.Poongodi -poongodi@ksrct.ac.in

| **60 AM E21** | **Artificial Intelligence in Gaming** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

### Objective
- To understand the fundamentals of intelligent behavior and decision making in games
- To apply the relevant algorithms in path finding strategies
- To design games using artificial intelligence techniques based on the genre.

### Prerequisite
NIL

### CourseOutcomes
On the successful completion of the course students will be able to

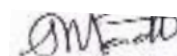| CO1 | Recognize the importance of artificial intelligence in games. | Understand |
|---|---|---|
| CO2 | Identify the different steering behaviour in movement of characters. | Remember |
| CO3 | Illustrate the path finding techniques for designing games. | Analyze |
| CO4 | Examine decision making method for games. | Analyze |
| CO5 | Categorize the strategies for the games using game theory. | Analyze |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 3 | 2 | | | | 2 | 2 | 2 | 2 | 3 | 2 |
| 2 | 3 | 3 | 3 | 2 | 2 | | | | 3 | 2 | 2 | 2 | 2 | 2 |
| 3 | 2 | 3 | 3 | 2 | 2 | 2 | | | 2 | 2 | 2 | 2 | 2 | 2 |
| 4 | 3 | 3 | 2 | 2 | 3 | 2 | | | 3 | 3 | 2 | 2 | 2 | 2 |
| 5 | 3 | 2 | 2 | 2 | 2 | | | | 2 | 3 | 3 | 3 | 2 | 2 |

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## Assessment Pattern
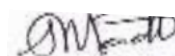
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

| K.S.Rangasamy College of Technology–AutonomousR2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM E21- Artificial Intelligence in Gaming** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction ***
Introduction to Game AI, kind of AI used in game development, model of game AI, AI engine structure.
[9]

**Movement Algorithms and Steering Behaviour ***
kinematic movement algorithms, problems related to the steering behaviour of objects and Solutions.Coordinated Movement and Motor Control-This unit discusses the concepts related to coordinated movements and motor control.
[9]

**Pathfinding***
Basic Path finding Algorithms in game development, Path finding for complex solutions.
[9]

**Decision-Making and Uncertainty***
Decision trees and state machines for game development, models for implementing knowledge uncertainty, such as fuzzy logic and Markov systems.
[9]

**Introduction to Learning Mechanisms***
Board game theory and discusses the implementation of some key algorithms, such as minimax and negamax, Random Number Generation and Minimaxing, algorithms for implementing action prediction, decision learning and reinforcement learning. and noise filtering and sensor data processing. Privacy &Security.
[9]

| | **Total Hours** | 45 |
|---|---|---|

**Text Book(s):**

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| 1. | https://www.athabascau.ca/syllabi/comp/comp452.php |
|----|---|
| 2. | https://www.udemy.com/course/artificial-intelligence-for-simple-games/ |

**Reference(s):**

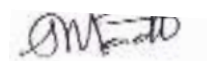| 1. | Artificial Intelligence for Games, Ian Millington and John Funge, CRC Press; 2nd edition, 2009. Benjamin Planche,Eliot Andres, Packt Publishers, 2019 |
|----|---|
| 2. | Artificial Intelligence and Games, Georgios N. Yannakakis and Julian Togelius, Springer International Publishing, 2018. |

\*SDG:9 - Innovation

**Course Contents and Lecture Schedule**

| Module No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | Introduction to Game AI | 2 |
| 1.2 | Kind of AI used in game development | 2 |
| 1.3 | Model of game AI | 2 |
| 1.4 | AI engine structure. | 2 |
| 1.5 | AI Engine Development | 1 |
| **2** | **Movement Algorithms and Steering Behaviour** | |
| 2.1 | Kinematic movement algorithms | 2 |
| 2.2 | Problems related to the steering behaviour of objects | 1 |
| 2.3 | Problems related to the steering behaviour of objects and Solutions | 1 |
| 2.4 | Movement | 1 |
| 2.5 | Motor Control | 1 |
| 2.6 | This unit discusses the concepts related to coordinated movements | 2 |
| 2.7 | This unit discusses the concepts related to coordinated movements and motor control. | 1 |
| **3** | **Pathfinding** | |
| 3.1 | Basic Path finding Algorithms in game development | 1 |
| 3.2 | Pathfinding in Games | 2 |
| 3.3 | Heuristic techniques | 1 |
| 3.4 | Meta-Heuristic techniques | 1 |
| 3.5 | Path Finding | 2 |
| 3.6 | Path finding for complex solutions | 2 |

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| 4 | **Decision-Making and Uncertainty** | |
|---|---|---|
| 4.1 | Decision | 1 |
| 4.2 | Making and Uncertainty | 2 |
| 4.3 | Decision trees | 1 |
| 4.4 | State machines for game development | 2 |
| 4.5 | Models for implementing knowledge uncertainty | 1 |
| 4.6 | Fuzzy logic | 1 |
| 4.7 | Markov systems. | 1 |
| **5** | **Introduction to Learning Mechanisms** | |
| 5.1 | Board game theory | 1 |
| 5.2 | Discusses the implementation of some key algorithms | 1 |
| 5.3 | Minimax and negamax, | 1 |
| 5.4 | Random Number Generation and Minimaxing | 1 |
| 5.5 | Algorithms for implementing action prediction | 1 |
| 5.6 | Decision learning and reinforcement learning | 2 |
| 5.7 | Noise filtering and sensor data processing. | 1 |
| 5.8 | Privacy &Security | 1 |
| | **Total** | 45 |

## CourseDesigners

1. R.KABILA  -kabila@ksrct.ac.in

| 60 AM E22 | **Predictive Analysis** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

### Objective

- Understand the fundamentals of Predictive Analysis.
- Understand how to transform data and make it suitable for data driven predictive tasks.
- Understand how to compute basic statistics using real-world datasets
- Learn to represent uncertain knowledge in Gradient Descent
- Understand the different types Diagnostics for Data.
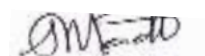
### Prerequisite

NIL

### CourseOutcomes

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

| CO1 | Understand the fundamentals of Predictive Analysis. | Remember, Understand, Analyze |
| CO2 | Understand how to transform data and make it suitable for data driven predictive tasks. | Remember, Apply, Analyze |
| CO3 | Understand how to compute basic statistics using real-world datasets . | Remember, Understand, Apply Analyze |
| CO4 | Learn to represent uncertain knowledge in Gradient Descent | Remember, Understand, Apply |
| CO5 | Understand the different types Diagnostics for Data. | Remember, Apply |

## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |

## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|
| 60 AM E22- Predictive Analysis | | | |
| AIML | | | |
| | Hours/Week | | Credit | Maximum Marks |

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| Semester | L | T | P | Total hrs | C | CA | ES | Total |
|---|---|---|---|---|---|---|---|---|
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |
| | | | | | | | | |

| | |
|---|---|
| **Introduction**<br>Data Product, Data Product Examples in Enterprise, Developing a Data Product Strategy | **[9]** |
| **Reading Data in Python**<br>Reading CSV & JSON Files, Processing Structured Data in Python, Live-Coding: JSON, Extracting Simple Statistics from Datasets<br>**Data Processing in Python**<br> Data Filtering and Cleaning, Processing Text and Strings in Python, Processing Times and Dates in Python | **[9]** |
| **Python Libraries and Toolkits**<br> Matrix Processing and Numpy, Introduction to Data Visualization, Introduction to Matplotlib, urllib and BeautifulSoup | **[9]** |
| **Gradient Descent** Classification in Python, Introduction to Training and Testing, Gradient Descent in Python, Gradient Descent in TensorFlow | **[9]** |
| **Diagnostics for Data**<br> Meaningful Predictive modelling, Regression Diagnostic, Over- and Under-Fitting, Classification Diagnostics: Accuracy and Error, Classification Diagnostics: Precision and Recall. Codebase for Evaluation and Validation, Model Complexity and Regularization, Evaluating Classifiers for Ranking. | **[9]** |
| **Total Hours** | **45** |

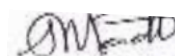| Text book(s): | |
|---|---|
| 1. | Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst, Dean Abbott, 2014, Wiley |
| 2. | Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking, Tom Fawcett, O'Reilly, 1st edition, 2013 |
| **Reference(s):** | |
| 1. | https://www.coursera.org/learn/basic-data-processing-visualization-python |
| 2. | https://www.coursera.org/learn/design-thinking-predictive-analytics-data-products |
| 3. | https://www.coursera.org/learn/meaningful-predictive-modeling |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction** | |

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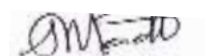| 1.1 | Data Product | 2 |
|---|---|---|
| 1.2 | Data Product Examples | 2 |
| 1.3 | Data Product Examples in Enterprise | 2 |
| 1.4 | Developing a Data Product Strategy | 1 |
| 1.5 | Developing a Data Product Strategy Examples | 2 |
| **2** | **Reading Data and Processing in Python** | |
| 2.1 | Reading CSV & JSON Files | 2 |
| 2.2 | Processing Structured Data in Python | 1 |
| 2.3 | Live-Coding: JSON | 2 |
| 2.4 | Extracting Simple Statistics from Datasets | 1 |
| 2.5 | Data Filtering and Cleaning | 1 |
| 2.6 | Processing Text and Strings in Python | 1 |
| 2.7 | Processing Times and Dates in Python | 1 |
| **3** | **Python Libraries and Toolkits** | |
| 3.1 | Matrix Processing and Numpy | 2 |
| 3.2 | Introduction to Data Visualization | 2 |
| 3.3 | Introduction to Matplotlib | 2 |
| 3.4 | Introduction to urllib | 1 |
| 3.5 | Introduction to BeautifulSoup | 2 |
| **4** | **Gradient Descent** | |
| 4.1 | Classification in Python | 1 |
| 4.2 | Introduction to Training and Testing | 2 |
| 4.3 | Introduction to Testing | 2 |
| 4.4 | Gradient Descent in Python | 2 |
| 4.5 | Gradient Descent in TensorFlow | 2 |
| **5** | **Diagnostics for Data** | |
| 5.1 | Meaningful Predictive modelling | 1 |
| 5.2 | Regression Diagnostic, Over- and Under-Fitting | 2 |
| 5.3 | Classification Diagnostics: Accuracy and Error | 1 |
| 5.4 | Classification Diagnostics: Precision and Recall. | 1 |
| 5.5. | Codebase for Evaluation and Validation | 1 |
| 5.6. | Model Complexity and Regularization | 2 |
| 5.7. | Evaluating Classifiers for Ranking | 1 |

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| | Total | 45 |
|---|---|---|

**CourseDesigners**

1.K.KAVIARASU          -kaviarasuk@ksrct.ac.in

| 60 AM E23 | **Artificial Intelligence in Healthcare** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

**Objective**

- To understand models of human and artificial intelligence, specifically computational models of intelligence
- To comprehend a collection of machine learning models their applications in healthcare
- To identify and apply appropriate intelligent system models and computational tools to specific problems in healthcare.

**Prerequisite**

NIL

**CourseOutcomes**

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

| CO1 | Understand and apply on tree-based machine learning to estimate patient survival rates | Understand |
|---|---|---|
| CO2 | Analyze convolutional neural network image classification and segmentation models to make diagnoses of lung and brain disorders.. | Analyze |
| CO3 | Apply natural language processing to extract information from unstructured medical data. | Apply |
| CO4 | Understand different types of prognosis models related to different diseases. | Understand |
| CO5 | Analyze the performance of specific models as applied to biomedical problems, and justify their use and limitations | Analyze |
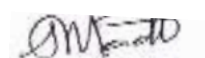
**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | 3 | 2 | | | | 2 | 2 | 2 | 2 | 3 | 2 |
| 2 | 3 | 3 | 2 | 3 | 2 | | | | 3 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 2 | 2 | 2 | 3 | 2 | | | 2 | 2 | 2 | 2 | 2 | 2 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | 3 | 3 | 2 | 2 | 2 | 2 |
| 5 | 3 | 3 | 3 | 2 | 2 | | | | 2 | 3 | 3 | 3 | 2 | 2 |

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## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|
| **60 AM E23- Artificial Intelligence in Healthcare** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |
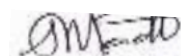
**Disease detection with computer vision***
Medical Image Diagnosis, Eye Disease and Cancer Diagnosis, Building and Training a Model for Medical Diagnosis, Training, prediction, and loss, Image Classification and Class Imbalance, Generating More Samples, Model Testing. **[9]**

**Evaluating models***
Sensitivity, Specificity, and Evaluation Metrics, Accuracy in terms of conditional probability, Confusion matrix, ROC curve and Threshold, Image segmentation on MRI images-Medical Image Segmentation, MRI Data and Image Registration, Segmentation, 2D U-Net and 3D U-Net Data augmentation and loss function for segmentation, Different Populations and Diagnostic Technology, External validation. **[9]**

**Linear prognostic models****
Medical Prognosis, Atrial fibrillation, Liver Disease Mortality, Risk of heart disease, Evaluating Prognostic Models, Concordant Pairs, Risk Ties, Permissible Pairs,Prognosis with Tree-based models **-**Decision trees for prognosis, fix overfitting, Different distributions, Missing Data example, Imputation. **[9]**

**Survival Models and Time***
Survival Model, Survival function, collecting time data, Estimating the survival function, Build a risk model using linear and tree-based models - Hazard Functions, Relative risk, Individual vs. baseline hazard, Survival Trees, Nelson Aalen estimator. **[9]**

**Medical Treatment Effect Estimation***
Analyze data from a randomized control trial, Average treatment effect, Conditional average treatment effect, T-Learner, S-Learner, C-for-benefit. **[9]**

| | Total Hours | 45 |
|---|---|---|

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| Text Book(s): | |
|---|---|
| 1. | https://www.coursera.org/learn/ai-for-medical-diagnosis |
| 2. | https://www.coursera.org/learn/ai-for-medical-prognosis#syllabus |
| **Reference(s):** | |
| 1. | https://www.coursera.org/learn/ai-for-medical-treatment#syllabus Benjamin Planche, Eliot Andres, Packt Publishers, 2019 |
| 2. | Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again, Eric Topol, Basic Books, 1st edition 2019. |
| 3. | Machine Learning and AI for Healthcare: Big Data for Improved Health Outcomes, ArjunPanesar, Apress, 1st ed. Edition, 2019. |
| 4. | Artificial Intelligence in Healthcare, 2020, ISBN 978-0-12-818438-7, Elsevier Inc. |

**\*SDG:3 - Healthcare**

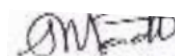**\*\*SDG:9 - Innovation**

## Course Contents and Lecture Schedule

| Module No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Disease detection with computer vision** | |
| 1.1 | Medical Image Diagnosis | 2 |
| 1.2 | Eye Disease and Cancer Diagnosis | 1 |
| 1.3 | Building and Training a Model for Medical Diagnosis | 2 |
| 1.4 | Training, prediction, and loss | 1 |
| 1.5 | Image Classification and Class Imbalance | 1 |
| 1.6 | Generating More Samples, Model Testing | 2 |
| **2** | **Evaluating models** | |
| 2.1 | Sensitivity, Specificity, and Evaluation Metrics | 2 |
| 2.2 | Accuracy in terms of conditional probability | 1 |
| 2.3 | Confusion matrix, ROC curve and Threshold | 1 |
| 2.4 | Image segmentation on MRI images -Medical Image Segmentation, Segmentation | 1 |
| 2.5 | MRI Data and Image Registration | 1 |
| 2.6 | 2D U-Net and 3D U-Net Data augmentation and loss function for segmentation | 1 |
| 2.7 | Different Populations and Diagnostic Technology | 1 |
| 2.8 | External validation | 1 |
| **3** | **Linear prognostic models** | |
| 3.1 | Medical Prognosis | 1 |

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| | | |
|---|---|---|
| 3.2 | Atrial fibrillation | 1 |
| 3.3 | Liver Disease Mortality, Risk of heart disease, | 1 |
| 3.4 | Evaluating Prognostic Models, Concordant Pairs, | 1 |
| 3.5 | Risk Ties, Permissible Pairs | 1 |
| 3.6 | Prognosis with Tree-based models -Decision trees for prognosis | 2 |
| 3.7 | Fix overfitting, Different distributions, | 1 |
| 3.8 | Missing Data example, Imputation | 1 |
| **4** | **Survival Models and Time** | |
| 4.1 | Survival Model, Survival function | 1 |
| 4.2 | Collecting time data | 2 |
| 4.3 | Estimating the survival function, | 1 |
| 4.4 | Build a risk model using linear and tree-based models - Hazard Functions | 2 |
| 4.5 | Relative risk, Individual vs. baseline hazard, | 1 |
| 4.6 | Survival Trees | 1 |
| 4.7 | Nelson Aalen estimator | 1 |
| **5** | **Medical Treatment Effect Estimation** | |
| 5.1 | Analyze data from a randomized control trial | 1 |
| 5.2 | Average treatment effect | 1 |
| 5.3 | Conditional average treatment effect | 2 |
| 5.4 | T-Learner | 1 |
| 5.5 | S-Learner | 2 |
| 5.6 | C-for-benefit | 2 |
| | **Total** | 45 |

**Course Designers**
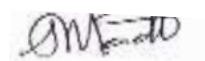
1. R.KABILA - kabila@ksrct.ac.in

| | | | | | | |
|---|---|---|---|---|---|---|
| **60 AM E24** | **Genome Sequencing** | Category | L | T | P | Credit |
| | | PE | 3 | 0 | 0 | 3 |

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### Objective

- Understand Genomic information has been instrumental in identifying inherited.
- Interpret the knowledge of comprehensive method for analyzing entire genomes.
- Gain knowledge on genomes can help us to identify the cause of genetic diseases.
- Learn to DNA sequences has become indispensable for basic biological research
- Understand the Integrative Genomics Viewer to visualize genomes.

### Prerequisite

NIL

### CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand the concepts of whole genomes of organisms, and incorporates elements from genetics. | Remember, Understand, Analyze |
|------|------|------|
| CO2 | Interpret the knowledge of galaxy and command line tools to process and manipulate data | Remember, Apply, Analyze |
| CO3 | Understand to develop novel antibiotics and diagnostic tests. | Remember, Understand, Apply Analyze |
| CO4 | Describe the ribosomal RNA, intermediates in cell-wall synthesis, or membranes. | Remember, Understand, Apply |
| CO5 | Summarize of the structure and function of the organism than genomics. | Remember, Apply |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |
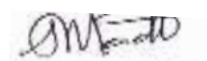
### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------|------|------|------|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |

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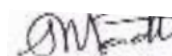
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| | | | |
|---|---|---|---|
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|
| **60 AM E 24 - Genome Sequencing** | | | | | | | |
| B.E. artificial intelligent and machine learning | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction**

Genomics**,** Genomic Data Science, Molecular Biology Structures, From Genes to Phenotypes, Polymerase Chain Reaction, Next Generation Sequencing, Applications of Sequencing, The String Reconstruction Problem, String Reconstruction as a Hamiltonian Path Problem, String Reconstruction as a Eulerian Path Problem. **[9]**

**Genomic data science with galaxy**

Challenges of Reproducibility, Introduction to the Galaxy Platform, Genomic Intervals, Workflows, Sequence Data Quality Control, ChIP-Sequence Analysis with MACS, RNA-seq Analysis: Mapping, RNA Sequence Analysis: Assembly Quantitation, and Differential Expression. **[9]**

**Sequencing Antibiotics**

Discovery of Antibiotics, How Do Bacteria Make Antibiotics, Sequencing Antibiotics by Shattering them into Pieces, A Brute Force Algorithm for Cyclopeptide Sequencing, Cyclopeptide Sequencing with Branch and Bound. **[9]**

**Ideal to Real Spectra for Antibiotics Sequencing**

Adapting Sequencing for Spectra with Errors, from 20 to More than 100 Amino Acids, The Spectral Convolution, apply genome assembly tools to sequencing data from a dangerous pathogenic bacterium. **[9]**

**Proteomics**

Protein structure, proteomics, and protein-protein interaction networks. **[9]**

| Total Hours | **45** |
|---|---|

| Text book(s): | |
|---|---|
| 1. | https://www.coursera.org/learn/genome-sequencing#syllabus |
| 2. | https://www.coursera.org/learn/galaxy-project?specialization=genomic-data-science#syllabus |
| 3. | Genome Data Analysis 2019 by Ju Han Kim |
| 3. | Genomes 5 By Terry A. Brown Edition5th Edition First Published2023 eBook Published28 April 2023 Pub.LocationBoca                    RatonImprintCRC                    Press DOIhttps://doi.org/10.1201/9781003133162Pages548eBook          ISBN9781003133162 SubjectsBioscience |

| Reference(s): | |
|---|---|
| 1. | Bioinformatics with Python Cookbook, Packt Publishing, 2015 |
| 2. | A.L. Lind, Y.Y.Y. Lai, Y. Mostovoy, A.K. Holloway, A. Iannucci, et al. Genome of the Komodo dragon reveals adaptations in the cardiovascular and chemosensory systems of monitor lizards Nat Ecol Evol, 3 (2019), pp. 1241-1252 |

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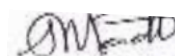| S.No. | Topic | No.of Hours |
|---|---|---|
| 3. | A.C. Rand, M. Jain, J.M. Eizenga, A. Musselman-Brown, H.E. Olsen, et al. Mapping DNA methylation with high-throughput nanopore sequencing Nat Methods, 14 (2017), pp. 411-413 | |
| 4. | K. Shafin, T. Pesout, R. Lorig-Roach, M. Haukness, H.E. Olsen, et al. Efficient de novo assembly of eleven human genomes using PromethION sequencing and a novel nanopore toolkit bioRxiv, 561 (2019) | |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction** | |
| 1.1 | Introduction – define is Genomic Data and Molecular Biology Structures | 1 |
| 1.2 | From Genes to Phenotypes and Polymerase Chain Reaction | 1 |
| 1.3 | Next Generation Sequencing and Applications of Sequencing | 1 |
| 1.4 | The String Reconstruction Problem | 2 |
| 1.5 | String Reconstruction as a Hamiltonian Path Problem | 2 |
| 1.6 | String Reconstruction as a Eulerian Path Problem | 2 |
| 2 | **Genomic data science with galaxy** | |
| 2.1 | Challenges of Reproducibility | 1 |
| 2.2 | Introduction to the Galaxy Platform, Genomic Intervals, | 2 |
| 2.3 | Workflows, Sequence Data Quality Control | 1 |
| 2.4 | ChIP-Sequence Analysis with MACS | 1 |
| 2.5 | RNA-seq Analysis: Mapping, RNA Sequence Analysis | 1 |
| 2.5.1 | RNA Sequence Analysis | 1 |
| 2.5.2 | Assembly Quantitation | 1 |
| 2.6 | Differential Expression | 1 |
| 3 | **Sequencing Antibiotics** | |
| 3.1 | Discovery of Antibiotics | 2 |
| 3.2 | How Do Bacteria Make Antibiotics, Sequencing Antibiotics by Shattering them into Pieces | 3 |
| 3.3 | A Brute Force Algorithm for Cyclopeptide Sequencing | 2 |
| 3.4 | Cyclopeptide Sequencing with Branch and Bound | 2 |

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| 4 | Ideal to Real Spectra for Antibiotics Sequencing | |
|---|---|---|
| 4.1 | Adapting Sequencing for Spectra with Errors, from 20 to More than 100 Amino Acids | 5 |
| 4.2 | The Spectral Convolution, apply genome assembly tools to sequencing data from a dangerous pathogenic bacterium. | 4 |
| 5 | Proteomics | |
| 5.1 | Protein structure | 3 |
| 5.2 | proteomics | 3 |
| 5.3 | protein-protein interaction networks. | 3 |
| | Total | 45 |

## CourseDesigners

1.J.ARUN          -arunj@ksrct.ac.in

| 60 AM E25 | Algorithms for DNA Sequencing | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

## Objective

- Understand the concepts of String matching algorithms useful for information retrieval, intrusion detection, music retrieval, database queries, language syntax checker, bioinformatics, DNA sequence matching aspects
- Interpret the knowledge of finding approximate substring matches inside a given string and finding dictionary strings that match the pattern approximately.
- Learn new concepts from industry experts
- Gain a foundational understanding of a subject or tool
- Develop job-relevant skills with hands-on projects

## Prerequisite

NIL
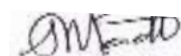
## CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand the concepts of String matching algorithms useful for information retrieval, intrusion detection, music retrieval, database queries, language syntax checker, bioinformatics, DNA sequence matching aspects | Remember, Understand, Analyze |
|---|---|---|
| CO2 | Interpret the knowledge of finding approximate substring matches inside a given string and finding dictionary strings that match the pattern approximately. | Remember, Apply, Analyze |

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| | | |
|---|---|---|
| CO3 | Understand to develop approximate string matching can be formulated in terms of edit distance | Remember, Understand, Apply Analyze |
| CO4 | Describe the iterative expansion of overlap relationships between sequences to construct the target genome. | Remember, Understand, Apply |
| CO5 | Summarize of assembler is a Software that converts an assembly language code to machine code | Remember, Apply |

**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |

**Assessment Pattern**
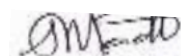
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 60 AM E 25- Algorithms for DNA Sequencing | | | | | | | | |
| B.E. artificial intelligent and machine learning | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |

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| | V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |
|---|---|---|---|---|---|---|---|---|---|

**DNA sequencing, strings and matching**

DNA sequencing past and present, Genomes as strings, reads as substrings, String definitions and Python examples, How DNA gets copied, Sequencing reads in FASTQ format, Sequencers give pieces to genomic puzzles, Read alignment and why it's hard, Naive exact matching Reconstruction as a Eulerian Path Problem. Reconstruction as a Eulerian Path Problem **[9]**

**Pre-processing, indexing and approximate matching**

Boyer-Moore basics, Diversion: Repetitive elements, Pre-processing, Indexing and the k-mer index, ordered structures for indexing, hash tables for indexing, Variations on k-mer indexes, Genome indexes used in research, Approximate matching, Hamming and edit distance, Pigeonhole principle.. **[9]**

**Edit distance, assembly, overlaps**

Solving the edit distance problem, using dynamic programming for edit distance, a new solution to approximate matching, Meet the family: global and local alignment, read alignment in the field, Assembly: working from scratch, First and second laws of assembly, Overlap graphs. **[9]**

**Algorithms for assembly**

The shortest common superstring problem, Greedy shortest common superstring, Third law of assembly: repeats are bad, De Bruijn graphs and Eulerian walks, When Eulerian walks go wrong, **[9]**

**Assemblers in practice**

Assemble a genome from small pieces of DNA, comparing genomes of different species, gene finding, gene regulation, Cancer Sequencing, Fragment Assembly, Human Population Genomics **[9]**

| | **Total Hours** | **45** |
|---|---|---|

**Text book(s):**

1. https://www.coursera.org/specializations/genomic-data-science
2. Python for Bioinformatics, Sebastian Bassi, Chapman and Hall/CRC.

**Reference(s):**

1. Bioinformatics with Python Cookbook, Packt Publishing, 2015

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **DNA sequencing, strings and matching** | |
| 1.1 | DNA sequencing past and present | 1 |
| 1.2 | Genomes as strings and reads as substrings | 1 |
| 1.3 | String definitions and Python examples | 1 |
| 1.4 | How DNA gets copied, Sequencing reads in FASTQ format | 1 |
| 1.5 | Sequencers give pieces to genomic puzzles | 2 |

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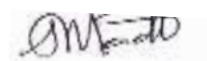| 1.6 | Read alignment and why it's hard, Naive exact matching Reconstruction as a Eulerian Path Problem | 2 |
|---|---|---|
| 1.7 | Reconstruction as a Eulerian Path Problem | 1 |
| **2** | **Pre-processing, indexing and approximate matching** | |
| 2.1 | Boyer-Moore basics | 1 |
| 2.2 | Diversion: Repetitive elements, Pre-processing | 1 |
| 2.3 | Pre-processing | 1 |
| 2.4 | Indexing and the k-mer index and ordered structures for indexing | 1 |
| 2.5 | Hash tables for indexing | 1 |
| 2.6 | Variations on k-mer indexes | 1 |
| 2.7 | Genome indexes used in research | 1 |
| 2.8 | Approximate matching and Hamming and edit distance | 1 |
| 2.9 | Pigeonhole principle | 1 |
| **3** | **Edit distance, assembly, overlaps** | |
| 3.1 | Solving the edit distance problem | 2 |
| 3.1.1 | Dynamic programming for edit distance, a new solution to approximate matching | 3 |
| 3.2 | Meet the family: global and local alignment | 2 |
| 3.3 | Read alignment in the field, Assembly: working from scratch | 2 |
| 3.4 | First and second laws of assembly, Overlap graphs | |
| **4** | **Algorithms for assembly** | |
| 4.1 | The shortest common superstring problem | 2 |
| 4.2 | Greedy shortest common superstring | 2 |
| 4.3 | Third law of assembly: repeats are bad | 2 |
| 4.4 | De Bruijn graphs and Eulerian walks | 2 |
| 4.5 | When Eulerian walks go wrong | 1 |
| **5** | **Assemblers in practice** | |
| 5.1 | Assemble a genome from small pieces of DNA | 2 |
| 5.1.2 | Comparing genomes of different species | 2 |
| 5.1.3 | Gene finding | 1 |
| 5.1.4 | Gene regulation | 1 |
| 5.2 | Cancer Sequencing | 1 |
| 5.3 | Fragment Assembly | 1 |

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| 5.4 | Human Population Genomics | 1 |
|------|---------------------------|---|
| | **Total** | 45 |

## CourseDesigners

1. J.ARUN                                   -arunj@ksrct.ac.in

| 60 AM E26 | **Bioinformatics** | Category | L | T | P | Credit |
|-----------|--------------------|----------|---|---|---|--------|
| | | PE | 3 | 0 | 0 | 3 |

## Objective
- Understand the fundamentals of problem solving.
- Interpret the knowledge and reasoning in propositional logic and first order logic.
- Gain knowledge on Planning and acting in the real world.
- Learn to represent uncertain knowledge in solving AI problems
- Understand the different forms of learning.

## Prerequisite
NIL

## Course Outcomes
Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand the concepts of intelligent agents and problem solving aspects. | Remember, Understand, Analyze |
|-----|---------------------------------------------------------------------------|-------------------------------|
| CO2 | Interpret the knowledge of propositional logic and FOL. | Remember, Apply, Analyze |
| CO3 | Understand the issues of planning problems. | Remember, Understand, Apply Analyze |
| CO4 | Describe the Uncertainty and probabilistic reasoning. | Remember, Understand, Apply |
| CO5 | Summarize the types of learning methods and AI applications. | Remember, Apply |
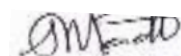
## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |

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| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |
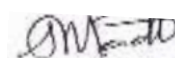
## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E26- Bioinformatics** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| **Introduction** | |
|---|---|
| History – scope and important contributions – aims and tasks of Bioinformatics – applications of Bioinformatics – challenges and opportunities – introduction to NCBI data model – various file formats for biological sequences. | **[9]** |
| **Biological Databases and Data Search Methods** | |
| Importance of databases – biological databases – primary sequence databases – composite sequence databases – secondary databases – nucleic and sequence databases – protein sequence databases – structure databases – bibliographic databases – specialized genomic resources – analysis packages Methods for searching sequence databases like FASTA and BLAST algorithms – Statistical analysis and evaluation of BLAST results. | **[9]** |
| **Sequence Comparison Methods** | |
| Methods for comparison of two sequences – Needleman Wush and Smith Waterman algorithms Analysis of computational complexities – merits and demerits of these algorithms – theory of scoring matrices and their use for sequence comparison. | **[9]** |
| **Sequence Alignment Methods** | |
| Sequence analysis of biological data – significance of sequence alignment – pair wise sequence alignment methods – use of scoring matrices and gap penalties in sequence alignments – multiple sequence alignment methods – tools and applications of multiple sequence alignment. | **[9]** |

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| | Predictive Methods Using DNA and Protein Sequences | |
|---|---|---|
| | Gene prediction strategies – protein prediction strategies – molecular visualization tools – phylogenetic analysis: concept of trees – phylogenetic trees and multiple alignments. | **[9]** |
| | **Total Hours** | **45** |

**Text book(s):**

| 1. | Andreas D Baxevanis& B F Francis, "Bioinformatics-A practical guide to analysis of Genes and Proteins", John Wiley, 2010 |
|---|---|
| 2. | T K Attwood, D J Parry-Smith, "Introduction to Bioinformatics", Pearson Education, 2005 |

**Reference(s):**

| 1. | Neil C. Jones, Pavel A. Pevzner, "An introduction to Bioinformatics Algorithms", MIT Press, 2005 |
|---|---|
| 2. | Gary Benson Roderic, "Algorithms in Bioinformatics", Springer, 2004 |
| 3. | Foundations of Bioinformatics, ManojDarbari, Khanna Book Publishing Co., 2013. |
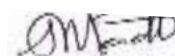
**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction** | |
| 1.1 | History | 2 |
| 1.2 | scope and important contributions | 1 |
| 1.3 | aims and tasks of Bioinformatics | 2 |
| 1.4 | applications of Bioinformatics, challenges and opportunities | 1 |
| 1.5 | introduction to NCBI data model | 1 |
| 1.6 | various file formats for biological sequences | 2 |
| **2** | **Biological Databases and Data Search Methods** | |
| 2.1 | Importance of databases | 2 |
| 2.2 | biological databases, primary sequence databases | 1 |
| 2.3 | composite sequence databases, secondary databases | 1 |
| 2.4 | nucleic and sequence databases, protein sequence databases | 1 |
| 2.5 | structure databases, bibliographic databases | 1 |
| 2.6 | specialized genomic resources | 1 |
| 2.7 | analysis packages Methods for searching sequence databases like | 1 |

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| | FASTA and BLAST algorithms | |
|---|---|---|
| 2.8 | Statistical analysis and evaluation of BLAST results | 1 |
| **3** | **Sequence Comparison Methods** | |
| 3.1 | Methods for comparison of two sequences | 2 |
| 3.2 | Needleman Wush and Smith Waterman algorithms | 2 |
| 3.3 | Analysis of computational complexities | 2 |
| 3.4 | merits and demerits of these algorithms | 1 |
| 3.5 | theory of scoring matrices and their use for sequence comparison | 2 |
| **4** | **Sequence Alignment Methods** | |
| 4.1 | Sequence analysis of biological data | 1 |
| 4.2 | significance of sequence alignment | 2 |
| 4.3 | pair wise sequence alignment methods | 1 |
| 4.4 | use of scoring matrices and gap penalties in sequence alignments | 2 |
| 4.5 | multiple sequence alignment methods | 2 |
| 4.6 | tools and applications of multiple sequence alignment | 1 |
| **5** | **Predictive Methods Using DNA and Protein Sequences** | |
| 5.1 | Gene prediction strategies | 2 |
| 5.2 | protein prediction strategies | 1 |
| 5.3 | molecular visualization tools | 2 |
| 5.4 | phylogenetic analysis: concept of trees | 2 |
| 5.5. | phylogenetic trees and multiple alignments | 2 |
| | **Total** | **45** |

## Course Designers

1. S. B. Thamarai selvi  -thamaraiselvi@ksrct.ac.in

| 60 AM E31 | Soft Computing | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

### Objective
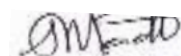
- To understand the soft computing techniques in problem solving.
- To understand the concepts of various neural network architectures..
- To learn and understanding the perceptions of fuzzy system as they apply.
- To know the importance of solving machine learning problems.
- To learn the design and implementation of soft computing-based solutions for real-world problems.

### Prerequisite

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NIL

## CourseOutcomes

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

| CO1 | Understand, identify and describe soft computing techniques and their roles in building intelligent machines. | Remember, Understand, Analyze |
|------|------|------|
| CO2 | Interpret the various neural network architectures. | Remember, Understand, Apply Analyze |
| CO3 | Analyze the various fuzzy logic and neuro fuzzy systems approaches for the given problem. | Remember, Understand, Apply Analyze |
| CO4 | Apply and analyze the machine learning techniques for solving real world problems. | Understand, Apply, Analyze |
| CO5 | Investigate the genetic algorithm concepts and their applications. | Understand, Apply, Analyze |

## Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 3 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| 2 | 3 | 3 | 3 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| 3 | 3 | 3 | 3 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| 4 | 3 | 3 | 3 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| 5 | 3 | 3 | 3 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
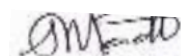
## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------|------|------|------|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 40 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E31 - Soft Computing** ||||||||
| B.E. Artificial Intelligence and Machine Learning ||||||||
| Semester | Hours/Week ||| Total hrs | Credit | Maximum Marks |||
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 2 | 45 | 4 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction to Neural Networks**<br>Structure and Working of Biological Neural Network, Fundamentals of Artificial Neural Networks and Applications, Characteristics of Artificial Neural Networks, History of Neural Network Research, Characteristics of Neural Networks Terminology. | **[9]** |
| **Neural Networks Models and Learning Methods * & ***<br>Models of Neuron McCulloch, Pitts Model, Perceptron, Adaline Model, Basic Learning Laws, Topology of Neural Network Architecture, Multilayer Neural Networks, Learning Methods, Back Propagation, Counter Propagation, ART, BAM, Associative Memories. | **[9]** |
| **Introduction of Fuzzy logic and Neuro Fuzzy Systems * & ***<br>Introduction, Fuzzy Sets, Fuzzy Model, Fuzzy Rule Generation Fuzzy Inference System, Defuzzification, Architecture of a Neuro-Fuzzy System and Its Applications. | **[9]** |
| **Machine Learning * & ***<br>Supervised Learning, Primitive Algorithms, Generative Algorithms, Support Vector Machine, Ensemble Methods. Unsupervised Learning, K-Means, Principal Component Analysis, Independent Component Analysis. Reinforcement Learning and Control. | **[9]** |
| **Applications * & ***<br>Applications of GA and GP, Hybrid Systems. | **[9]** |
| **Total Hours** | **45** |

**Text Book(s):**

| | |
|---|---|
| 1. | Jyh-Shing R Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-fuzzy and Soft Computing: A Computational Approach To Learning and Machine Intelligence", Pearson Education, First Edition, 2015. |
| 2. | Ikvinderpal Singh, "Soft Computing", Khanna Book Publishers, First Edition, 2010. |

**Reference(s):**

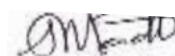| | |
|---|---|
| 1. | Vojislav Kecman, "Learning and Soft Computing: Support Vector Machines, Neural Networks, and Fuzzy Logic Models", Pearson Education, 2006. |
| 2. | Bo Yuan, George J. Klir, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", Pearson, Second Edition, 2015. |
| 3. | LiMin Fu, "Neural Network in Computer Intelligence", McGraw-Hill Education, First Edition, 2003. |
| 4. | S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic , and Genetic Algorithms Synthesis and Application", PHI Learning Private Limited, 2010. |
| 5. | S.N.Sivanandam, S.N.Deepa, "Principles of Soft Computing", John Wiley and Sons, Second Edition 2011. |

* SDG:9 - Industry Innovation and Infrastructure

** SDG:3 – Good Health and Well Being

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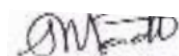
BoS Chairman

## Course Contents and Lecture Schedule

| S.No. | Topic | No.of Hours |
|-------|-------|-------------|
| **1** | **Introduction to Neural Networks** | |
| 1.1 | Structure and Working of Biological Neural Network | 1 |
| 1.2 | Fundamentals of Artificial Neural Networks | 1 |
| 1.3 | Neural Networks Applications | 1 |
| 1.4 | Characteristics of Artificial Neural Networks | 2 |
| 1.5 | History of Neural Network Research | 2 |
| 1.6 | Characteristics of Neural Networks Terminology | 2 |
| **2** | **Neural Networks Models and Learning Methods** | |
| 2.1 | Models of Neuron McCulloch | 1 |
| 2.2 | Pitts Model, Perceptron | 1 |
| 2.3 | Adaline Model, Basic Learning Laws | 1 |
| 2.4 | Topology of Neural Network Architecture | 1 |
| 2.5 | Multilayer Neural Networks | 1 |
| 2.6 | Learning Methods, Back Propagation | 1 |
| 2.7 | Counter Propagation | 1 |
| 2.8 | ART, BAM | 1 |
| 2.9 | Associative Memories | 1 |
| **3** | **Introduction of Fuzzy logic and Neuro Fuzzy Systems** | |
| 3.1 | Introduction, Fuzzy Sets | 1 |
| 3.2 | Fuzzy Model | 2 |
| 3.3 | Fuzzy Rule Generation Fuzzy Inference System | 2 |
| 3.4 | Defuzzification | 1 |
| 3.5 | Architecture of a Neuro-Fuzzy System | 2 |
| 3.6 | Applications | 1 |
| **4** | **Machine Learning** | |
| 4.1 | Supervised Learning, Primitive Algorithms | 1 |
| 4.2 | Generative Algorithms | 1 |
| 4.3 | Support Vector Machine | 1 |
| 4.4 | Ensemble Methods | 1 |
| 4.5 | Unsupervised Learning, K-Means | 1 |
| 4.6 | Principal Component Analysis | 1 |
| 4.7 | Independent Component Analysis | 1 |
| 4.8 | Reinforcement Learning and Control | 2 |
| **5** | **Applications** | |
| 5.1 | Applications of GA and GP | 3 |
| 5.2 | Hybrid systems | 4 |
| 5.3 | Review and Examples | 2 |
| | **Total** | 45 |

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1.Dr.R.GOPINATH           -  gopinath@ksrct.ac.in

| 60 AM E32 | Computational Neuroscience | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

### Objective

- Understand the fundamentals of Computational Neuroscience.
- Interpret the Neural Encoding Models and Convolutions and Linear Systems.
- Gain knowledge on Extracting Information from Neurons & Neural coding.
- Learn to represent Computing in Carbon and Computing with Networks.
- Understand the different forms of  Learning from Supervision and Rewards.

### Prerequisite

NIL

### Course Outcomes

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

| CO1 | Understand the concepts of Descriptive Models and Making Connections aspects. | Remember, Understand, Analyze |
|---|---|---|
| CO2 | Understand the knowledge of Feature Selection and Linear Systems. | Remember, Apply, Analyze |
| CO3 | Apply and explore various techniques for extract the neurons information using neural coding. | Remember, Understand, Apply |
| CO4 | Understand network models to explore recurrent network dynamics and computational paradigms within carbon-based computing systems. | Understand, Apply |
| CO5 | Explore various supervised and reinforcement learning with neurons | Apply, Analyze |

### Mapping with Programme Outcomes
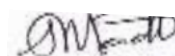
| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 2 | 3 | 3 | 3 | 2 | | | | 2 | 2 | | 2 | 3 |
| 2 | 2 | 2 | 3 | 3 | 3 | 2 | | | | 2 | 2 | | 2 | 3 |
| 3 | 2 | 2 | 3 | 3 | 3 | 2 | | | | 2 | 2 | | 2 | 3 |
| 4 | 2 | 2 | 3 | 3 | 3 | 2 | | | | 2 | 2 | | 2 | 3 |
| 5 | 2 | 2 | 3 | 3 | 3 | 2 | | | | 2 | 2 | | 2 | 3 |

### Assessment Pattern

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| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 20 | 20 | 30 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 15 | 15 | 20 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|
| **60 AM E32-Computational Neuroscience** | | | | | | | |
| **AIML** | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

**Introduction & Basic Neurobiology**

Computational Neuroscience: Descriptive Models, Computational Neuroscience: Mechanistic and Interpretive Models, The Electrical Personality of Neurons, Making Connections: Synapses, Time to Network: Brain Areas and their Function. Reconstruction as aEulerian Path Problem. [9]
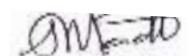
**Neural Encoding Models**

Neural Encoding: Simple Models, Feature Selection, Variability, Vectors and Functions, Convolutions and Linear Systems, Change of Basis and PCA. [9]

**Extracting Information from Neurons & Neural coding ***

Neural Decoding and Signal Detection Theory, Population Coding and Bayesian Estimation, Reading Minds: Stimulus Reconstruction, Information and Entropy, Calculating Information in Spike Trains, Coding Principles. [9]

**Computing in Carbon and Computing with Networks**

Modelling Neurons, Spikes, Simplified Model Neurons, A Forest of Dendrites, modelling Connections Between Neurons, Introduction to Network Models, The Fascinating World of Recurrent Networks. [9]

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| | Plasticity in the Brain & Learning ** <br> Synaptic Plasticity, Hebb's Rule, and Statistical Learning, Introduction to Unsupervised Learning, Sparse Coding and Predictive Coding <br> **Learning from Supervision and Rewards** <br> Neurons as Classifiers and Supervised Learning, Reinforcement Learning: Predicting Rewards, Reinforcement Learning: Time for Action | [9] |
|---|---|---|
| | **Total Hours** | 45 |

| **Text Book(s):** | |
|---|---|
| 1. | https://www.coursera.org/learn/computational-neuroscience#syllabus |
| 2. | https://www.edx.org/course/computational-neuroscience-neuronal-dynamics-of-co |

| **Reference(s):** | |
|---|---|
| 1. | Fundamentals of Computational Neuroscience, Thomas Trappenberg, OUP Oxford; 2nd edition, 2009. |
| 2. | An Introductory Course in Computational Neuroscience, Paul Miller, The MIT Press; 1st edition, 2018. |

**\*SDG:3 – Good Health and Well Being**
**\*\*SDG:4- Quality Education**
**Course Contents and Lecture Schedule**
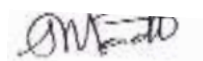
| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction & Basic Neurobiology** | |
| 1.1 | Descriptive Models, Computational Neuroscience: Mechanistic and Interpretive Models | 2 |
| 1.2 | The Electrical Personality of Neurons | 1 |
| 1.3 | Making Connections: Synapses | 2 |
| 1.4 | Uninformed search strategies | 1 |
| 1.5 | Time to Network: Brain Areas and their Function | 1 |
| 1.6 | Reconstruction as aEulerian Path Problem | 2 |
| 2 | **Neural Encoding Models** | |
| 2.1 | Neural Encoding: Simple Models | 2 |
| 2.2 | Feature Selection | 1 |
| 2.3 | Variability | 1 |
| 2.4 | Vectors and Functions | 1 |
| 2.5 | Convolutions and Linear Systems | 2 |
| 2.6 | Change of Basis and PCA. | 2 |
| 3 | **Extracting Information from Neurons & Neural coding** | |

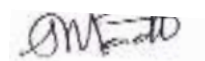| 3.1 | Neural Decoding and Signal Detection Theory | 2 |
|------|---------------------------------------------|---|
| 3.2 | Population Coding and Bayesian Estimation | 2 |
| 3.3 | Reading Minds: Stimulus Reconstruction | 1 |
| 3.4 | Information and Entropy | 1 |
| 3.5 | Calculating Information in Spike Trains | 1 |
| 3.6 | Coding Principles | 2 |
| **4** | **Computing in Carbon and Computing with Networks** | |
| 4.1 | Modelling Neurons | 1 |
| 4.2 | Spikes | 1 |
| 4.3 | Simplified Model Neurons | 1 |
| 4.4 | A Forest of Dendrites | 2 |
| 4.5 | modelling Connections Between Neurons | 1 |
| 4.6 | Introduction to Network Models | 1 |
| 4.7 | The Fascinating World of Recurrent Networks. | 2 |
| **5** | **Plasticity in the Brain & Learning** | |
| 5.1 | Synaptic Plasticity | 1 |
| 5.2 | Hebb's Rule, and Statistical Learning | 2 |
| 5.3 | Introduction to Unsupervised Learning | 1 |
| 5.4 | Sparse Coding and Predictive Coding | 2 |
| 5.5. | Neurons as Classifiers and Supervised Learning | 1 |
| 5.6. | Reinforcement Learning: Predicting Rewards | 1 |
| 5.7. | Reinforcement Learning: Time for Action | 1 |
| | **Total** | 45 |

## Course Designers

1. Ms.T.Subulakshmi – Subulakshmi@ksrct.ac.in

| 60 AM E33 | **Artificial Intelligence in Finance** | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | PE | 3 | 0 | 0 | 3 |

**Objective**

- To know the InsurTech and Real estateTech.
- To study the knowledge of robo advisors and its features.
- Gain knowledge on stock selection and wealth management.
- To learn the compliance and fraud detection in real time
- Analyze the various applications for financial aspects using AI.

**Prerequisite**

NIL

**CourseOutcomes**

Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand how InsurTech is redefining the insurance industry using AI techniques. | Remember, Understand, Analyze |
|---|---|---|
| CO2 | Understand the business model of robo/AI-advisors. | Remember, Apply, Analyze |
| CO3 | Understand stock selection and asset management related to financial world. | Remember, Understand, Apply Analyze |
| CO4 | Identify the compliance and fraud detection in real time | Remember, Apply |
| CO5 | Apply the various applications for financial aspects using AI. | Remember, Apply |

**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 3 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 3 | 3 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 3 | 3 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 3 | 3 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | | 3 |
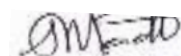
**Assessment Pattern**
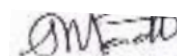
| **Bloom's Category** | **Continuous Assessment Tests (Marks)** | **End Sem Examination** |
|---|---|---|

|  | 1 | 2 | (Marks) |
|---|---|---|---|
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 10 | 20 |
| Apply (Ap) | 15 | 10 | 30 |
| Analyze (An) | 20 | 30 | 30 |
| Evaluate (Ev) | 0 | 0 | 0 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E33- Artificial Intelligence in Finance** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 2 | 0 | 2 | 45 | 3 | 40 | 60 | 100 |

**Introduction**

Fintech Innovations: Series Map and Learning Goals- Introduction to InsurTech- Investment & Market Size of the InsurTech Industry-Real Estate Tech-Residential Real Estate Tech Startups-Commercial Real Estate Tech Reconstruction as a Eulerian Path Problem-Reconstruction as aEulerian Path Problem. **[9]**

**Robo Advising**

Expected Returns-Standard Deviations and Correlation- Building an Efficient Portfolio-Diversified Investments-Exchange Traded Funds- Robo-Advisors, Pure Advisors vs Robo-Advisors-Customer support using robo advisors. **[9]**

**Stock Selection & Asset Management**

Fundamental Analysis: The Passive Benchmark, Manager Performance-Stock Selection Screening: Discovering Signals and Data Issue-Neural Networks-Smart Beta-Wealth Management: Automated Portfolio Optimization-Portfolio Rebalancing Recommendations **[9]**

**Compliance and Fraud Detection**

Behavioural Profiling Analytics in Fraud Detection-Distinguishing Specialized from Generic Behaviour Analytics **[9]**

**Case Studies**

Fetch.ai-platforms or apps using AI for financial aspects. **[9]**

| | **Total Hours** | **45** |
|---|---|---|

**Text book(s):**

1. https://www.coursera.org/learn/invest-tech#syllabus

2. https://www.coursera.org/learn/wharton-ai-application-insurtech-real-estate-technology#syllabus

**Reference(s):**

1. https://www.coursera.org/learn/innovation-strategy-fintech

2. https://my.cfte.education/courses/AI-in-Finance-Specialisation

3. Artificial Intelligence in Finance, Yves Hilpisch, O'Reilly Media, Inc., 2020

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| S.No. | | |
|---|---|---|
| 4. | Machine Learning for Finance: Principles and Practice for Financial Insiders, JannesKlaas, Packt Publishing Limited, 2019. | |
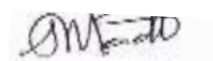
**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction** | |
| 1.1 | Fintech Innovations: Series Map and Learning Goals | 2 |
| 1.2 | Introduction to InsurTech | 1 |
| 1.3 | Investment & Market Size of the InsurTech Industry | 1 |
| 1.4 | Real Estate Tech | 1 |
| 1.5 | Residential Real Estate | 1 |
| 1.6 | Tech Startups | 1 |
| 1.7 | Commercial Real Estate Tech | 1 |
| 1.8 | Reconstruction as a Eulerian Path Problem | 1 |
| 2 | **Robo Advising** | |
| 2.1 | Expected Returns | 2 |
| 2.2 | Standard Deviations and Correlation | 2 |
| 2.3 | Building an Efficient Portfolio | 1 |
| 2.4 | Diversified Investments | 1 |
| 2.5 | Exchange Traded Funds | 1 |
| 2.6 | Robo-Advisors, Pure Advisors vs Robo-Advisor | 1 |
| 2.7 | Customer support using robo advisors | 1 |
| 3 | **Stock Selection & Asset Management** | |
| 3.1 | Fundamental Analysis: The Passive Benchmark | 2 |
| 3.2 | Manager Performance | 1 |
| 3.3 | Stock Selection Screening: Discovering Signals and Data Issue | 1 |

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| 3.4 | Neural Networks | 1 |
|-----|-----------------|---|
| 3.5 | Smart Beta | 1 |
| 3.6 | Wealth Management: Automated Portfolio Optimization | 2 |
| 3.7 | Portfolio Rebalancing Recommendations | 1 |
| **4** | **Compliance and Fraud Detection** | |
| 4.1 | Behavioural Profiling Analytics in Fraud Detection | 5 |
| 4.2 | Distinguishing Specialized from Generic Behaviour Analytics | 4 |
| **5** | **Case Studies** | |
| 5.1 | Fetch.ai | 5 |
| 5.2 | Platforms or apps using AI for financial aspects. | 4 |
| | **Total** | 45 |

## Course Designers

1. Mr.R.Vijay Sai  -vijaysair@ksrct.ac.in

| **60 AM E34** | **Machine Learning with Python** | Category | L | T | P | Credit |
|---------------|----------------------------------|----------|---|---|---|--------|
| | | PE | 3 | 0 | 0 | 3 |

### Objective

The students will be able to handle various data types and datasets in python. They will also be able to implement various machine learning model sin python.

### Prerequisite

NIL

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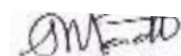
On the successful completion of the course, students will be able to

| CO1 | Understand python and be able to handle various datasets in python. | Remember, Understand, Analyze |
|-----|--------------------------------------------------------------------|-------------------------------|
| CO2 | Understand basic machine learning algorithms. | Remember, Apply, Analyze |
| CO3 | Apply different classification and clustering algorithms for problem solving. | Remember, Understand, Apply |

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| | | Analyze |
|---|---|---|
| CO4 | Create basic machine learning algorithms in python. | Remember, Understand, Apply |
| CO5 | Apply different unsupervised learning techniques. | Remember, Apply |

**Mapping with Programme Outcomes**

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |

**Assessment Pattern**
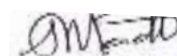
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|------------------|-----|-----|------|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| **60 AM E34– Machine Learning with Python** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 2 | 45 | 4 | 40 | 60 | 100 |
| **Introduction to Python:** Data Types, Operators, Expression, Indexing & Slicing, Strings, Conditionals, Functions, Control Flow, Nested Loops, Sets & Dictionaries | | | | | | | | **[9]** |
| **Introduction to Machine Learning:** Machine Learning Vs Statistical Modelling, Supervised vs Unsupervised Learning, Supervised Learning Classification, Unsupervised Learning, Reinforcement Learning, Applications, Python libraries suitable for Machine Learning: Pandas, Numpy, Scikit- | | | | | | | | **[9]** |

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| | | |
|---|---|---|
| learn, visualization libraries: matplotlib etc. | | |
| **Regression:**<br>Simple Linear Regression, Multiple Linear Regression, Non-linear Regression, Model Evaluation in Regression Models, Evaluation Metrics in Regression Models | **[9]** | |
| **Classification:**<br>Introduction to Classification, K-Nearest Neighbour, Decision Trees, Logistic Regression, Support Vector Machines, Logistic regression vs Linear regression, Evaluation Metrics in Classification | **[9]** | |
| **Unsupervised Learning:**<br>Intro to Clustering, K-Means Clustering, Hierarchical Clustering, Density-Based Clustering, Content-based recommender systems, Collaborative Filtering | **[9]** | |
| **Total Hours** | **45** | |

| Text book(s): | |
|---|---|
| 1. | Hands–On Machine Learning with Scikit–Learn and TensorFlow 2e: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurelien Geron, O'Reilly, 2017 |
| 2. | Python Machine Learning - Third Edition, Sebastian Raschka , Vahid Mirjalili, Packt Publishers, 2019 |

| Reference(s): | |
|---|---|
| 1. | Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition by Andreas C. Müller, Sarah Guido, O'Reilly, 2016 |
| 2. | https://www.coursera.org/learn/machine-learning-with-python |
| 3. | https://www.edx.org/course/machine-learning-with-python-a-practical-introduct |

**\*SDG:4- Quality Education**
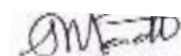
**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Introduction to Python:** | |
| 1.1 | Data Types, Operators | 1 |
| 1.2 | Expression | 1 |
| 1.3 | Indexing & Slicing | 1 |

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| 1.4 | Strings | 1 |
|---|---|---|
| 1.5 | Conditionals | 1 |
| 1.6 | Functions | 1 |
| 1.7 | Control Flow | 1 |
| 1.8 | Nested Loops | 1 |
| 1.9 | Sets & Dictionaries | 1 |
| **2** | **Introduction to Machine Learning:** | |
| 2.1 | Machine Learning Vs Statistical Modelling | 2 |
| 2.2 | Supervised vs Unsupervised Learning | 1 |
| 2.3 | Supervised Learning Classification | 1 |
| 2.4 | Unsupervised Learning | 1 |
| 2.5 | Reinforcement Learning, Applications, | 1 |
| 2.6 | Python libraries suitable for Machine Learning: Pandas | 1 |
| 2.7 | Numpy | 1 |
| 2.8 | Scikit-learn | 1 |
| 2.9 | visualization libraries: matplotlib etc. | 1 |
| **3** | **Regression:** | |
| 3.1 | Simple Linear Regression | 1 |
| 3.2 | Multiple Linear Regression | 2 |
| 3.3 | Non-linear Regression | 2 |
| 3.4 | Model Evaluation in Regression Models | 2 |
| 3.5 | Evaluation Metrics in Regression Models | 2 |
| **4** | **Classification:** | |
| 4.1 | Introduction to Classification | 1 |
| 4.2 | K-Nearest Neighbour | 1 |
| 4.3 | Decision Trees | 2 |
| 4.4 | Logistic Regression | 2 |
| 4.5 | Support Vector Machines | 1 |
| 4.6 | Logistic regression vs Linear regression | 1 |
| 4.7 | Evaluation Metrics in Classification | 1 |
| **5** | **Unsupervised Learning:** | |
| 5.1 | Intro to Clustering | 1 |
| 5.2 | K-Means Clustering | 2 |

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| 5.3 | Hierarchical Clustering | 2 |
|------|-------------------------|---|
| 5.4 | Density-Based Clustering | 2 |
| 5.5. | Content-based recommender systems | 1 |
| 5.6. | Collaborative Filtering | 1 |
| | **Total** | 45 |

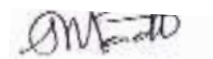## Course Designers

1. M.Saradha          -saradha@ksrct.ac.in

| **60 AM E35** | **Advanced Machine Learning** | Category | L | T | P | Credit |
|---------------|-------------------------------|----------|---|---|---|--------|
| | | PE | 3 | 0 | 0 | 3 |

### Objective

- To introduce advanced concepts and methods of machine learning
- To develop an understanding of the role of machine learning in massive scale automation.
- To design and implement various machine learning algorithms in a range of real-world applications.

### Prerequisite
NIL

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

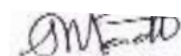| CO1 | Understand advanced concepts and methods of machine learning and to develop an understanding of the role of machine learning in massive scale automation. | Remember, Understand, Analyze |
|-----|-----|-----|
| CO2 | Apply various machine learning algorithms in a range of real-world applications. | Remember, Apply, Analyze |
| CO3 | Integrate and apply their expertise to produce solutions for real-world problems. | Remember, Understand, Apply Analyze |
| CO4 | Interpret and Analyze results with reasoning using different ML techniques. | Remember, Understand, Apply |
| CO5 | Apply the ensemble methods | Remember, Apply |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 2 | | 3 |
| 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |

**Assessment Pattern**
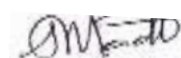
| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM E35- Advanced Machine Learning** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Artificial Neural Network**<br>Introduction to ANN, Perceptron, Cost Function, Gradient Checking, **multi-layer perceptron and back propagation algorithm that is used to help learn parameters for a neural network, Random Initialization** | **[9]** |
| **Bayesian Learning**<br> Probability theory and Bayes rule, Naive Bayes learning algorithm, Bayes nets. | **[9]** |
| **Decision Trees**<br> Representing concepts as decision trees, Recursive induction of decision trees, best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity, Overfitting, noisy data, and pruning. | **[9]** |
| **Reinforcement Learning**<br> **Reinforcement earning through feedback network, function approximation**. | **[9]** |

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| Ensemble Methods | |
|---|---|
| Bagging, boosting, stacking and learning with ensembles. Random Forest | **[9]** |

| | Total Hours | 45 |
|---|---|---|

| **Text book(s):** | |
|---|---|
| 1. | Tom Mitchell, Machine Learning, McGraw Hill, 1997. 2010 |
| 2. | Jeeva Jose, Introduction to Machine Learning, Khanna Book Publishing 2020. |

| **Reference(s):** | |
|---|---|
| 1. | Rajiv Chopra, Machine Learning, Khanna Book Publishing 2021 |
| 2. | Ethem Apaydin, Introduction to Machine Learning, 2e. The MIT Press, 2010. |
| 3. | https://www.coursera.org/learn/bayesian-methods-in-machine-learning?specialization=aml |
| 4. | Kevin P. Murphy, Machine Learning: a Probabilistic Perspective, The MIT Press, 2012. |

**\*SDG:4- Quality Education**
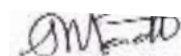
## Course Contents and Lecture Schedule

| S.No. | Topic | No.of Hours |
|---|---|---|
| **1** | **Artificial Neural Network** | |
| 1.1 | Introduction to ANN | 1 |
| 1.2 | Perceptron | 1 |
| 1.3 | Cost Function | 1 |
| 1.4 | Gradient Checking | 2 |
| 1.5 | multi-layer perceptron and back propagation algorithm that is used to help learn parameters for a neural network, | 2 |
| 1.6 | Random Initialization | 2 |
| **2** | **Bayesian Learning** | |
| 2.1 | Probability theory | 3 |
| 2.2 | Bayes rule | 2 |
| 2.3 | Naive Bayes learning algorithm | 2 |
| 2.4 | Bayes nets | 2 |
| **3** | **Decision Trees** | |
| 3.1 | Representing concepts as decision trees | 1 |
| 3.2 | Recursive induction of decision trees | 1 |
| 3.3 | best splitting attribute | 1 |
| 3.4 | entropy and information gain | 1 |

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| 3.5 | Searching for simple trees | 1 |
|---|---|---|
| 3.6 | computational complexity | 1 |
| 3.7 | Overfitting | 1 |
| 3.8 | noisy data | 1 |
| 3.9 | Pruning | |
| **4** | **Reinforcement Learning** | |
| 4.1 | Reinforcement earning through feedback network | 5 |
| 4.2 | function approximation | 4 |
| **5** | **Ensemble Methods** | |
| 5.1 | Bagging | 2 |
| 5.2 | Boosting | 2 |
| 5.3 | stacking and learning with ensembles. | 3 |
| 5.4 | Random Forest | 2 |
| | **Total** | 45 |

## CourseDesigners
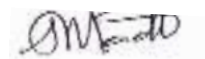
1. M.Saradha              -saradha@ksrct.ac.in

BoS Chairman

| K.S.Rangasamy College of Technology – Autonomous R2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **60 AM E36 - Professional Readiness for Innovation, Employability And Entrepreneurship** | | | | | | | |
| **Common to all Branches** | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| VI | 0 | 0 | 6 | 45 | 3 | 40 | 60 | 100 |

| **Objective(s)** | • To empower students with overall Professional and Technical skills required to solve a real world problem. <br> • To mentor the students to approach a solution through various stages of Ideathon, Research , Design Thinking , workflows , architecture and building a prototype in keeping with the end user and client needs. <br> • To provide experiential learning to enhance the Entrepreneurship and employability skills of the students. |
|---|---|
| **Course Outcomes** | **At the end of the course, the students will be able to** <br> CO1: Upskill In emerging technologies and apply to real industry-level use cases <br> CO2: Understand agile development process <br> CO3: Develop career readiness competencies, Team Skills/leadership qualities <br> CO4: Develop Time management, Project management skills and Communication Skills <br> CO5: Use Critical Thinking for Innovative Problem Solving <br> CO6: Develop entrepreneurship skills to independently work on products |

The course will involve 40-50 hours of technical training, and 40-50 hours of project development. The activities involved in the project along with duration are given in table 1.

**Table 1: Activities**

| Activity Name | Activity Description | Time(Weeks) |
|---|---|---|
| Choosing a Project | Selecting projects from the list of projects categorized various technologies & business domains | 2 |
| Team Formation | Students shall form a team of 4 members before enrolling to a project. Team members shall distribute the project activities among themselves. | 1 |
| Hands on training | Students will be provided with hands-on training on selected technology in which they are going to develop the project. | 2 |
| Project Development | Project shall be developed in agile mode. The status of the project shall be updated to the mentors via appropriate platform. | 6 |
| Code submission, project Doc and Demo | Project deliverable must include the working code, project document and demonstration video. All the project deliverables are to be uploaded to cloud based repository such as GitHub. | 3 |
| Mentor review and Approval | Mentor will be reviewing the project deliverable as per the milestone schedule and the feedback will be provided to the team. | 1 |
| Evaluation and Scoring | Evaluators will be assigned to the team to evaluate the project deliverable, and the scoring will be provided based on the evaluation metrics | 1 |
| Total | | 16 weeks |

Essentially, it involves 15 weeks of learning and doing, and one week for evaluation. The evaluation will be carried out to assess technical and soft skills as given in table 2.
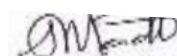
**Table 2: Evaluation Schema**

|  |  | | Skills | Weightage |
|---|---|---|---|---|
| I |  | | Technical Skills |  |
|  | 1 | | Technical Training & Assignments | 20% |
|  | 2 | | Project Planning | 5% |
|  | 3 | | Requirements Analysis | 5% |
|  | 4 | | Project Design | 5% |
|  | 5 | | Innovation | 5% |
|  | 6 | | Technology Stack (Utillization of various APIs, tools, techniques) | 5% |
|  | 7 | | Coding | 15% |
|  | 8 | | Acceptance Testing | 5% |
|  | 9 | | Performance | 5% |
| II |  | | Soft  Skills |  |
|  | 1 | | Team work | 5% |
|  | 2 | | Time management | 10% |
|  | 3 | | Attendance & Punctuality | 5% |
|  | 4 | | Project Documentation | 5% |
|  | 5 | | Project Demonstration | 5% |
| Total Scores |  | | | 100% |

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| 4 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| 5 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |

| 60 AM L01 | Robotics | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | OE | 3 | 0 | 0 | 3 |

### Objective
- To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.
- To provide information on various types of end effectors, their design, interfacing and selection
- To familiarize the basic concepts of transformations performed by robot.
- To perform kinematics and to gain knowledge on programming of robots.

### Prerequisite
NIL

### CourseOutcomes
Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand the basics of robotics | Understand, Analyze |
|---|---|---|
| CO2 | Understand game playing concepts involving robotics and AI. | Apply, Analyze |
| CO3 | Apply robotics to create robot driven systems. | Understand, Apply |
| CO4 | Analyze and co-relate robotics with AI and use in real-world applications | Apply. Analyze |
| CO5 | Apply the industrial robotic applications | Apply |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 3 | 2 | 3 | | 2 | | 3 | 2 | | 2 | | |
| 2 | 2 | 3 | 3 | 2 | 3 | | 2 | | 3 | 2 | | 2 | | 3 |
| 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | | 3 | 2 | | 2 | | 3 |
| 4 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | | 3 | 2 | | 3 | | 3 |
| 5 | 2 | 3 | 3 | 2 | 3 | | 2 | | 3 | 2 | | 3 | | 2 |

### Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

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|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| **60 AM L01- Robotics** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| | 3 | 0 | 2 | 45 | 4 | 40 | 60 | 100 |

| | |
|:---|:---:|
| **Introduction: Introduction to Robotics Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming**, requirements of a robot programming language, problems peculiar to robot programming languages. | [9] |
| **Need of AI in Robotics:** History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents. | [9] |
| **Game Playing:\* AI and game playing, plausible move generator, static evaluation move generator, game playing strategies, problems in game playing**. | [9] |
| **Robotics fundamentals:** Robot Classification, Robot Specification, notation, kinematic representations and transformations, dynamics techniques; trajectory planning and control. | [9] |
| **Robotics and Its applications\***: DDD concept, Intelligent robots, Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-**Speed of Robot, Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system** | [9] |
| **Total Hours** | 45 |

**Text Book(s):**

| | |
|:---:|:---|
| 1. | Robotics, Vision and Control: Fundamental Algorithms in MATLAB, Peter Corke, Springer, 2016. |
| 2. | Robotics: Everything You Need to Know About Robotics from Beginner to Expert, Peter McKinnon, Createspace Independent Publishing Platform, 2016. |

**Reference(s):**

| | |
|:---:|:---|
| 1. | Introduction to AI Robotics, Second Edition, By Robin R. Murphy, MIT press, 2017. |
| 2. | Artificial Intelligence for Robotics: Build intelligent robots that perform human tasks using AI techniques, Francis X. Govers, Packt Publishers, 2018. |

**\*SDG:4 Quality Education,**
**\*\*SDG:9 Industry, Innovation, Infrastructure, Promote inclusive and sustainable industrialization.**

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|:---|:---|:---:|
| **1** | **Introduction** | |
| 1.1 | Introduction to Robotics Fundamentals of Robotics | 1 |
| 1.2 | Robot Kinematics: Position Analysis | 1 |
| 1.3 | Dynamic Analysis and Forces | 2 |
| 1.4 | Robot Programming languages & systems | 1 |
| 1.5 | The three levels of robot programming | 1 |

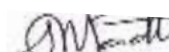| | | | |
|---|---|---|---|
| 1.6 | Requirements of a robot programming language | 2 |
| 1.7 | Problems peculiar to robot programming languages. | 1 |
| **2** | **Need of AI in Robotics** | |
| 2.1 | History | 2 |
| 2.2 | state of the art | 2 |
| 2.3 | Need for AI in Robotics | 1 |
| 2.4 | Thinking and acting humanly | 1 |
| 2.5 | Intelligent agents | 1 |
| 2.6 | Structure of agents | 2 |
| **3** | **Game Playing** | |
| 3.1 | AI and game playing | 2 |
| 3.2 | plausible move generator | 2 |
| 3.3 | static evaluation move generator | 2 |
| 3.4 | game playing strategies | 1 |
| 3.5 | problems in game playing | 2 |
| **4** | **Robotics fundamentals** | |
| 4.1 | Robot Classification | 1 |
| 4.2 | Robot Specification | 2 |
| 4.3 | notation | 1 |
| 4.4 | kinematic representations | 2 |
| 4.5 | transformations | 1 |
| 4.6 | dynamics techniques | 1 |
| 4.7 | trajectory planning and control | 1 |
| **5** | **Robotics and Its applications** | |
| 5.1 | DDD concept, Intelligent robots | 1 |
| 5.2 | Robot anatomy-Definition | 1 |
| 5.3 | law of robotics, History and Terminology of Robotics | 1 |
| 5.4 | Accuracy and repeatability of Robotics | 1 |
| 5.5. | Simple problems-Specifications of Robot | 1 |
| 5.6. | Speed of Robot, Robot joints and links | 2 |
| 5.7. | Architecture of robotic systems-Robot Drive systems | 1 |
| 5.8. | Hydraulic, Pneumatic and Electric system | 1 |
| | **Total** | 45 |

## CourseDesigners

1. Dr.P.Senthilraja          -senthilraja@ksrct.ac.in

| 60 AM L02 | Image and video processing | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| | | OE | 3 | 0 | 0 | 3 |

### Objective
- Understanding of the digital image formation and visualization.
- Interpret the knowledge of visualization of relationships between spatial and frequency.
- Understanding of mapping the signal processing techniques to the digital image
- To enhance the quality of images, extract meaningful information from images, and automate image-based tasks.
- Video processing techniques are used in television sets, VCRs, DVDs, video codecs, video players and other devices.

### Prerequisite
NIL

### CourseOutcomes
Onthesuccessful completion ofthecourse,studentswill beable to

| CO1 | Understand images and videos representation in a detailed manner | Remember, Understand, Analyze |
|---|---|---|
| CO2 | Interpret the knowledge of ML techniques for image processing in different scenarios | Remember, Apply, Analyze |
| CO3 | Gain knowledge on various object detection and image segmentation algorithms | Remember, Understand, Apply Analyze |
| CO4 | Methodologies for produce detection and localization was provided by analyzing different harvesting robots | Remember, Understand, Apply |
| CO5 | To understand image restoration is to enhance the visual quality, sharpness | Remember, Apply |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | | 2 | 2 | 2 | | | 2 | | | | 2 | | 3 |
| 4 | 3 | | 2 | 2 | 2 | | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | | 2 |

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## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM L02 - Image and video processing** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Image representation and analysis**<br>Introduction to computer Vision, Numerical representation of images, Image augmentation, enhancement, processing, color transforms, geometric transforms, feature recognition and extraction | **[9]** |
| **Image Segmentation**<br>Object detection, breaking image into parts, finding contours and edges of various objects in image, Background subtraction for video. | **[9]** |
| **Object Motion and tracking**<br>Tracking a single point over time, motion models to define object movement over time, analyze videos as sequences of individual image frames, methods to track a set of features over time, matching features from image frame to other, tracking a moving car using optical flow | **[9]** |
| **Robotic localization**<br>Bayesian statistics to locate a robot in space, sensor measurements to safely navigate an environment, Gaussian uncertainty, histogram filter for robot localization in python. | **[9]** |
| **Image Restoration**<br>Degradation model, noise models, estimation of degradation function by modeling, restoration using Weiner filters and Inverse filters | **[9]** |
| **Total Hours** | **45** |

| Text book(s): | |
|---|---|
| 1. | io Video Systems, Bali & Bali, Khanna Book Publishing 2020. |
| 2. | hon 3 Image Processing, Ashwin Pajankar, BPB Publication, 2019. |

| Reference(s): | |
|---|---|
| 1. | Image and Video Processing (eess.IV); Computer Vision and Pattern Recognition (cs.CV); Machine Learning (cs.LG) Journal-ref: Applied Sciences, 2022, vol. 12, no 13, p. 6448 |

| S.No. | | Topic | | No.of Hours |
|---|---|---|---|---|

Table continued from previous:

| 2. | Influence and Application of Digital Image Processing Technology on Oil Painting Creation in the Era of Big Data Lecture Notes in Electrical Engineering - Innovative Computing 2022 pp. 1367-1375Author(s): Yue Yu |
|---|---|
| 3 | Determination of Optical Rotation Based on Liquid Crystal Polymer Vortex Retarder and Digital Image Processing IEEE Access 2022 pp. 1-1Author(s): Sijia Huang ,Site Luo,Yang Yang |
| 4 | scholarly journals Color Enhancement of Low Illumination Garden Landscape ImagesTraitement du signal 2021 Vol 38 (6) pp. 1747-1754Author(s): Qian Zhang ,Shuang Lu,Lei Liu ,Yi Liu ,Jing Zhang |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Image representation and analysis** | |
| 1.1 | Introduction to computer Vision | 1 |
| 1.2 | Numerical representation of images | 1 |
| 1.3 | Image augmentation | 1 |
| 1.4 | Enhancement, processing | 2 |
| 1.5 | Color transforms | 2 |
| 1.6 | Geometric transforms, feature recognition and extraction | 2 |
| 2 | **Image Segmentation** | |
| 2.1 | Object detection | 3 |
| 2.2 | Breaking image into parts | 2 |
| 2.3 | Finding contours and edges of various objects in image | 2 |
| 2.4 | Background subtraction for video. | 2 |
| 3 | **Object Motion and tracking** | |
| 3.1 | Tracking a single point over time | 1 |
| 3.2 | Motion models to define object movement over time | 3 |
| 3.3 | Analyze videos as sequences of individual image frames, | 2 |
| 3.4 | Methods to track a set of features over time, matching features from image frame to other | 2 |
| 3.5 | Tracking a moving car using optical flow | 1 |
| 4 | **Robotic localization** | |
| 4.1 | Bayesian statistics to locate a robot in space | 2 |
| 4.2 | Sensor measurements to safely navigate an environment | 2 |
| 4.3 | Gaussian uncertainty | 3 |
| 4.4 | Histogram filter for robot localization in python | 2 |
| 5 | **Image Restoration** | |

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| 5.1 | Degradation model | 2 |
|------|---------------------------------------------------|-----|
| 5.2 | Noise models | 3 |
| 5.3 | Estimation of degradation function by modeling, | 2 |
| 5.4 | Restoration using Weiner filters and Inverse filters | 2 |
| | **Total** | 45 |

## Course Designers

1.ARUN  -arunj@ksrct.ac.in

| **60 AM L03** | **Machine Learning for Data Science** | Category | L | T | P | Credit |
|---------------|---------------------------------------|----------|---|---|---|--------|
| | | OE | 3 | 0 | 0 | 3 |

### Objective
- The students will be able to derive practical solutions using predictive analytics.
- They will also understand the importance of various algorithms in Data Science.

### Prerequisite
NIL

### CourseOutcomes

On the successful completion ofthecourse,students will be able to

| CO1 | Apply practical solutions using predictive analytics. | Remember, Understand, Analyze |
|-----|-------------------------------------------------------|-------------------------------|
| CO2 | Understand the importance of various algorithms in Data Science. | Remember, Apply, Analyze |
| CO3 | Create competitive advantage from both structured and unstructured data. | Remember, Understand, Apply Analyze |
| CO4 | Predict outcomes with supervised machine learning techniques. | Remember, Understand, Apply |
| CO5 | Unearth patterns in customer behavior with unsupervised techniques. | Remember, Apply |

### Mapping with Programme Outcomes

| CO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 1 | 3 | 3 | 2 | 2 | 2 | | | | | 2 | | 2 | | |
| 2 | 3 | 3 | 2 | 2 | 2 | | | | | | | 2 | | 3 |
| 3 | 3 | | 2 | 2 | 2 | | | 2 | | 3 | | 2 | | 3 |
| 4 | 3 | | 2 | 2 | 2 | | | | | | | 3 | | 3 |
| 5 | 3 | 3 | 2 | 2 | 2 | | | | | 3 | | 3 | | 2 |

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BoS Chairman

## Assessment Pattern

| Bloom's Category | Continuous Assessment Tests (Marks) | | End Sem Examination (Marks) |
|---|---|---|---|
| | 1 | 2 | |
| Remember (Re) | 10 | 10 | 10 |
| Understand (Un) | 15 | 15 | 20 |
| Apply (Ap) | 15 | 15 | 30 |
| Analyze (An) | 20 | 20 | 30 |
| Evaluate (Ev) | 0 | 0 | 10 |
| Create (Cr) | 0 | 0 | 0 |

| K.S.Rangasamy College of Technology–Autonomous R2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **60 AM L03 - Machine Learning for Data Science** | | | | | | | | |
| **AIML** | | | | | | | | |
| Semester | Hours/Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES | Total |
| V | 3 | 0 | 0 | 45 | 3 | 40 | 60 | 100 |

| | |
|---|---|
| **Introduction**<br>Algorithms and Machine Learning, Introduction to algorithms, Tools to analyze algorithms, Algorithmic techniques: Divide and Conquer, examples, Randomization, Applications | **[9]** |
| **Algorithms**<br>Graphs, maps, Map searching, Application of algorithms: stable marriages example, Dictionaries and hashing, search trees, Dynamic programming | **[9]** |
| **Application to Personal Genomics**<br>Linear Programming, NP completeness, Introduction to personal Genomics, Massive Raw data in Genomics, Data science on Personal Genomes, Interconnectedness on Personal Genomes, Case studies | **[9]** |
| **Machine Learning**<br>Introduction, Classification, Linear Classification, Ensemble Classifiers, Model Selection, Cross Validation, Holdout | **[9]** |
| **Machine Learning Applications**<br>Probabilistic modelling, Topic modelling, Probabilistic Inference, Application: prediction of preterm birth, Data description and preparation, Relationship between machine learning and statistics | **[9]** |
| **Total Hours** | **45** |

**Text book(s):**

1. Hands-On Data Science and Python Machine Learning, Frank Kane, Packt Publishers, 2017.
2. Data Science and Machine Learning: Mathematical and Statistical Methods Machine Learning & Pattern Recognition, by Dirk P. Kroese, Zdravko Botev, Thomas Taimre, Radislav Vaisman, Chapman & Hall/Crc, 2019.

**Reference(s):**

1. Data Science and Machine Learning Mathematical and Statistical MethodsDirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman 30th October 2023

Passed in BoS Meeting held on 02/12/23

Approved in Academic Council Meeting held on 23/12/23

BoS Chairman

| S.No. | | Topic | No.of Hours |
|---|---|---|---|
| 2. | | G. Strang. Linear Algebra and Learning from Data. Wellesley–Cambridge Press, Cambridge, 2019 | |
| 3 | | S. van Buuren. Flexible Imputation of Missing Data. CRC Press, Boca Raton, second edition, 2018 | |
| 4 | | Z. A. Shaw. Learning Python 3 the Hard Way. Addison–Wesley, Boston, 2017 | |

**Course Contents and Lecture Schedule**

| S.No. | Topic | No.of Hours |
|---|---|---|
| 1 | **Introduction** | |
| 1.1 | Algorithms and Machine Learning | 2 |
| 1.2 | Introduction to algorithms | 1 |
| 1.3 | Tools to analyze algorithms | 1 |
| 1.4 | Algorithmic techniques: Divide and Conquer, examples | 2 |
| 1.5 | Randomization | 2 |
| 1.6 | Applications | 1 |
| 2 | **Algorithms** | |
| 2.1 | Graphs, Map searching | 3 |
| 2.2 | Application of algorithms: stable marriages | 2 |
| 2.3 | Example, Dictionaries and hashing, search trees | 2 |
| 2.4 | Dynamic programming | 2 |
| 3 | **Application to Personal Genomics** | |
| 3.1 | Linear Programming | 1 |
| 3.2 | NP completeness | 3 |
| 3.3 | Introduction to personal Genomics | 1 |
| 3.4 | Massive Raw data in Genomics | 1 |
| 3.5 | Data science on Personal Genomes | 1 |
| 3.6 | Interconnectedness on Personal Genomes | 2 |
| 3.7 | Case studies | 1 |
| 4 | **Machine Learning** | |
| 4.1 | Introduction | 1 |
| 4.2 | Linear Classification | 2 |
| 4.3 | Ensemble Classifiers | 3 |
| 4.4 | Model Selection | 1 |
| 4.6 | Holdout | 1 |
| 4.5 | Cross Validation | 1 |

| 5 | Machine Learning Applications | |
|---|---|---|
| 5.1 | Probabilistic modelling | 1 |
| 5.2 | Topic modelling | 1 |
| 5.3 | Probabilistic Inference | 2 |
| 5.4 | Application: prediction of preterm birth | 2 |
| 5.5 | Data description and preparation | 1 |
| 5.6 | Relationship between machine learning and statistics | 2 |
| | **Total** | 45 |

## Course Designers

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