



# **KINGSTON ENGINEERING COLLEGE**

**(An Autonomous Institution)**

**(Approved by AICTE & COA, New Delhi, Affiliated to Anna University, Chennai)  
Chittoor Main Road, Christianpet,  
Katpadi, Vellore-632059**

## **DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

### **AUTONOMOUS CURRICULUM**

### **REGULATION 2026**

***Academic Year 2026-27 onwards***



## **INSTITUTE VISION**

To be a pioneer in engineering and management education by providing amicable ambience and being a centre for learning thereby perpetuating versatile professionals in engineering and management suitable for industry, higher education and research.

## **INSTITUTE MISSION**

- Developing, nurturing and building professionals with technical, research and managerial expertise, intellectual proficiency, right attitude and moral ethics.
- Building infrastructure that earmarks the institution to be the most preferred educational destination and provides the right ambience for creative and innovative teaching - learning process.
- Enabling learners to broaden their horizon and helping to meet global challenges.

## **QUALITY POLICY**

To establish and implement a robust quality system at Kingston Engineering College, encircling teaching, learning, research, and self-reliance, focusing on core and support functions to ensure accountability to stakeholders through continuous improvement and sustenance towards promoting holistic academic excellence.

**BACHELOR OF TECHNOLOGY**

**ARTIFICIAL INTELLIGENCE AND  
DATA SCIENCE**

**REGULATION – 2026(R-2026)**

**CURRICULUM**



**B.TECH. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE  
REGULATION – 2026**

**CURRICULUM SEMESTER I to VIII  
CHOICE BASED CREDIT SYSTEM**

**(For the Students admitted from the Academic Year 2026-27)**

**VISION**

To nurture graduates with advanced expertise in Artificial Intelligence and Data Science by fostering innovation, research excellence, and ethical practices, enabling them to contribute effectively to the rapidly evolving digital world and societal advancement.

**MISSION**

M1: To equip students with strong theoretical foundations, practical exposure, and ethical values through effective teaching-learning practices and research-oriented education.

M2: To encourage collaboration with industries, academic institutions, and research organizations for promoting innovation, technology exchange, and interdisciplinary learning.

M3: To instil professional ethics, social responsibility, transparency, and awareness of emerging technological challenges for building an inclusive and sustainable future.

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

Graduates will able to

**PEO1:** Build a strong foundation in mathematics, Artificial Intelligence, Data Science, and statistics for analysing, designing, and managing intelligent systems effectively.

**PEO2:** Develop the ability to pursue advanced research and innovative solutions in Artificial Intelligence and Data Science to address industrial and societal challenges.

**PEO3:** Demonstrate professional ethics, leadership qualities, teamwork, and interdisciplinary collaboration in professional practices and career development.

**PEO4:** Design and implement AI-driven solutions for solving complex real-world problems across diverse application domains.

**PEO5:** Foster creativity, innovation, and entrepreneurial abilities for developing sustainable and impactful technological solutions.

## PROGRAM OUTCOMES

**PO1 – Engineering Knowledge:** Apply math, science, and engineering fundamentals to complex problems.

**PO2 – Problem Analysis:** Identify and analyze complex problems using research and sustainability principles.

**PO3 – Design Solutions:** Design systems and processes considering health, safety, cost, culture, and environment.

**PO4 – Investigations:** Use experiments, modelling, and data analysis to reach valid conclusions.

**PO5 – Engineering Tools:** Apply modern tools for modelling and problem-solving, recognizing their limits.

**PO6 – Society & Environment:** Assess societal, legal, and environmental impacts of engineering solutions.

**PO7 – Ethics:** Commit to ethics, human values, diversity, and legal compliance.

**PO8 – Teamwork:** Work effectively as an individual and in multidisciplinary teams.

**PO9 – Communication:** Communicate clearly in reports, presentations, and documentation across diverse groups.

**PO10 – Management & Finance:** Apply management and economic principles in projects and teamwork.

**PO11 – Lifelong Learning:** Engage in continuous learning, adapt to new technologies, and think critically.

## PROGRAM SPECIFIC OUTCOMES (PSOs)

After the successful completion of the program, the graduates will be able to:

**PSO 1** – Design, develop, and deploy intelligent systems for real-world applications.

**PSO 2** – Utilize modern tools for innovative solutions in the field of AI and Data Science.

**PSO 3** – Demonstrate research aptitude, implement ethical practices and collaborate in multidisciplinary teams.

## MAPPING OF PROGRAM EDUCATIONAL OBJECTIVES WITH PROGRAM OUTCOMES

A broad relation between the program objective and the outcomes is given in the following table

| PROGRAM<br>EDUCATIONAL<br>OBJECTIVES | PROGRAM OUTCOMES |   |   |   |   |   |   |   |   |    |    |
|--------------------------------------|------------------|---|---|---|---|---|---|---|---|----|----|
|                                      | 1                | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| <b>I</b>                             | 3                | 2 | 2 | 2 | 3 | - | - | - | - | -  | -  |
| <b>II</b>                            | 2                | 3 | 3 | 3 | 3 | 1 | 1 | - | - | -  | -  |
| <b>III</b>                           | -                | - | 1 | - | - | 2 | 1 | 3 | 3 | 3  | 2  |
| <b>IV</b>                            | 2                | 3 | 3 | 2 | 3 | 1 | 1 | 1 | 2 | 2  | 1  |
| <b>V</b>                             | 1                | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2  | 3  |

1 - Low, 2 - Medium, 3 - High, '-' - no correlation

## MAPPING OF PROGRAM EDUCATIONAL OBJECTIVES WITH PROGRAM SPECIFIC OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

| PROGRAM<br>EDUCATIONAL<br>OBJECTIVES | PSO |   |   |
|--------------------------------------|-----|---|---|
|                                      | 1   | 2 | 3 |
| <b>I</b>                             | 3   | 3 | 2 |
| <b>II</b>                            | 2   | 3 | 3 |
| <b>III</b>                           | 2   | 1 | 3 |
| <b>IV</b>                            | 3   | 3 | 2 |
| <b>V</b>                             | 3   | 3 | 2 |

1 - Low, 2 - Medium, 3 - High, '-' - no correlation

**B.TECH. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE REGULATION  
– 2026**

**CURRICULUM SEMESTER I to VIII  
CHOICE BASED CREDIT SYSTEM  
(For the Students admitted from the Academic Year 2026-27)**

| S. No                                   | Course Code | Course Name                                   | Course Type | Contact Periods | L  | T | P  | C  | SDG         |
|-----------------------------------------|-------------|-----------------------------------------------|-------------|-----------------|----|---|----|----|-------------|
| <b>Theory Course</b>                    |             |                                               |             |                 |    |   |    |    |             |
| 1                                       | HS26101     | Heritage of Tamil                             | HS          | 1               | 1  | 0 | 0  | 1  | 4,11,17     |
| 2                                       | MA26102     | Linear Algebra and Calculus                   | BS          | 4               | 3  | 1 | 0  | 4  | 4,8,9,12,13 |
| <b>Lab Integrated Theory Course</b>     |             |                                               |             |                 |    |   |    |    |             |
| 3                                       | HS26102     | English for Interpersonal Communication-I     | HS          | 3               | 1  | 0 | 2  | 2  | 4, 8,16     |
| 4                                       | EC26C01     | Digital Principles and System Design          | ES          | 5               | 3  | 0 | 2  | 4  | 7,9,11,12   |
| 5                                       | CS26C01     | Programming in C                              | ES          | 5               | 3  | 0 | 2  | 4  | 4, 8,9      |
| 6                                       | CH26101     | Chemistry for Engineers                       | BS          | 5               | 3  | 0 | 2  | 3  | 6,7,9,12,13 |
| <b>Practical Course</b>                 |             |                                               |             |                 |    |   |    |    |             |
| 7                                       | ME26C11     | Engineering Foundation Laboratory             | ES          | 2               | 0  | 0 | 2  | 1  | 4, 8,9, 12  |
| <b>Employability Enhancement Course</b> |             |                                               |             |                 |    |   |    |    |             |
| 8                                       | PD26S01     | Digital Professional Skills                   | EE          | 2               | 0  | 0 | 2  | 1  | 4, 8,9      |
| <b>Mandatory Course</b>                 |             |                                               |             |                 |    |   |    |    |             |
| 9                                       | MC26101     | Student Induction Program                     | MC          | 3 weeks         | 0  | 0 | 0  | 0  | 4           |
| 10                                      | MC26102     | Foreign Language – Level I (German/ Japanese) | MC          | 2               | 0  | 0 | 2  | 1  | 4,8,17      |
| 11                                      | MC26103     | Physical Education I                          | MC          | 2               | 0  | 0 | 2  | 0  | 3,4,5       |
| <b>Audit Course</b>                     |             |                                               |             |                 |    |   |    |    |             |
| 12                                      | AC26101     | NSS/YRC/SDG/ Club Activities                  | AC          | 1 Week          | -  | - | -  | 0  | 3,11,17     |
| <b>TOTAL</b>                            |             |                                               |             | 31              | 14 | 1 | 16 | 21 | -           |

| Semester II                      |             |                                                  |             |                 |    |   |    |    |                |   |
|----------------------------------|-------------|--------------------------------------------------|-------------|-----------------|----|---|----|----|----------------|---|
| S. No                            | Course Code | Course Name                                      | Course Type | Contact Periods | L  | T | P  | C  | SDG            |   |
| Theory Course                    |             |                                                  |             |                 |    |   |    |    |                |   |
| 1                                | HS26201     | Tamil and Technology                             | HS          | 1               | 1  | 0 | 0  | 1  | 11             |   |
| 2                                | MA26C01     | Discrete Mathematics                             | BS          | 4               | 3  | 1 | 0  | 4  | 4, 9,11,12, 16 |   |
| 3                                | HS26202     | Universal Human Values-II: Understanding Harmony | HS          | 3               | 3  | 0 | 0  | 3  | 3, 4,16        |   |
| Lab Integrated Theory Course     |             |                                                  |             |                 |    |   |    |    |                |   |
| 4                                | HS26203     | English for Interpersonal Communication -II      | HS          | 3               | 1  | 0 | 2  | 2  | 4, 8,9         |   |
| 5                                | AD26201     | Data Structures and Algorithms                   | ES          | 5               | 3  | 0 | 2  | 4  | 4, 8,9, 17     |   |
| 6                                | CS26C02     | Python Programming                               | ES          | 5               | 3  | 0 | 2  | 4  | 4, 8,9         |   |
| 7                                | PH26201     | Physics for Artificial Intelligence              | BS          | 4               | 2  | 0 | 2  | 3  | 4, 7,9, 13     |   |
| Practical Course                 |             |                                                  |             |                 |    |   |    |    |                |   |
| 8                                | CS26C11     | Engineering Foundation Laboratory (CSE & ECE)    | ES          | 2               | 0  | 0 | 2  | 1  | 4, 8,9, 12     |   |
| Employability Enhancement Course |             |                                                  |             |                 |    |   |    |    |                |   |
| 9                                | PD26S02     | Professional Excellence and Career Development   | EE          | 2               | 0  | 0 | 2  | 1  | 3, 4,8, 16     |   |
| Mandatory Course                 |             |                                                  |             |                 |    |   |    |    |                |   |
| 10                               | MC26201     | Foreign Language-Level-II (Japanese/ German)     | MC          | 2               | 0  | 0 | 2  | 1  | 4,8,17         |   |
| 11                               | MC26202     | Physical Education II                            | MC          | 2               | 0  | 0 | 2  | 0  | 3,4,5          |   |
| Audit Course                     |             |                                                  |             |                 |    |   |    |    |                |   |
| 12                               | AC26201     | NSS/YRC/SDG/Club Activities                      | AC          | 1 Week          | -  | - | -  | 0  | 3, 11,17       |   |
| TOTAL                            |             |                                                  |             | 33              | 16 | 1 | 16 | 24 | -              | - |

### Semester III

| S. No                            | Course Code | Course Name                                    | Course Type | Contact Periods | L | T | P | C | SDG            |  |
|----------------------------------|-------------|------------------------------------------------|-------------|-----------------|---|---|---|---|----------------|--|
| Theory Course                    |             |                                                |             |                 |   |   |   |   |                |  |
| 1                                | MA26C02     | Probability and Statistics                     | BS          | 4               | 3 | 1 | 0 | 4 | 3,4,8,9,13     |  |
| 2                                | AD26301     | Object Oriented programming in JAVA            | PC          | 3               | 3 | 0 | 0 | 3 | 4,8,9          |  |
| Lab Integrated Theory Course     |             |                                                |             |                 |   |   |   |   |                |  |
| 3                                | AD26302     | Artificial Intelligence                        | PC          | 4               | 2 | 0 | 2 | 3 | 4,8,9,11,13    |  |
| 4                                | AD26303     | Foundations of Data Science                    | PC          | 5               | 2 | 0 | 3 | 4 | 4,8,9          |  |
| 5                                | AD26304     | Introduction to Operating Systems              | PC          | 4               | 2 | 0 | 2 | 3 | 4,9            |  |
| 6                                | AD26305     | Design thinking                                | ES          | 4               | 2 | 0 | 2 | 3 | 4,8,9,11,12,17 |  |
| Practical Course                 |             |                                                |             |                 |   |   |   |   |                |  |
| 7                                | AD26311     | Object Oriented programming in JAVA Laboratory | PC          | 2               | 0 | 0 | 2 | 1 | 4,8,9          |  |
| Employability Enhancement Course |             |                                                |             |                 |   |   |   |   |                |  |
| 8                                | AD26S01     | Employability Enhancement Skill – I            | EE          | 2               | 0 | 0 | 2 | 1 | 4, 8           |  |
| 9                                | AD26S02     | Industry Certification Course-I                | EE          | 2               | 0 | 0 | 2 | 1 |                |  |
| Mandatory Course                 |             |                                                |             |                 |   |   |   |   |                |  |
| 10                               | MC26301     | Environmental and Sustainable Future           | MC          | 2               | 2 | 0 | 0 | 2 | 11,12,13       |  |
| 11                               | MC26302     | Foreign Language-Level-III (Japanese/German)   | MC          | 2               | 0 | 0 | 2 | 1 | 4,8,17         |  |

| Audit Course |         |                                 |    |        |   |    |    |   |         |
|--------------|---------|---------------------------------|----|--------|---|----|----|---|---------|
| 12           | AC26301 | NSS/YRC/SDG/<br>Club Activities | AC | 1 Week | - | -  | -  | 0 | 3,11,17 |
|              |         | <b>TOTAL</b>                    | 30 | 14     | 1 | 15 | 23 |   |         |

| Semester IV                  |             |                                           |             |                 |   |   |   |   |                     |
|------------------------------|-------------|-------------------------------------------|-------------|-----------------|---|---|---|---|---------------------|
| S. No                        | Course Code | Course Name                               | Course Type | Contact Periods | L | T | P | C | SDG                 |
| Theory Course                |             |                                           |             |                 |   |   |   |   |                     |
| 1                            | AD26401     | Theory of Computation                     | PC          | 4               | 3 | 1 | 0 | 3 | 4,8,9, 11, 12,13,16 |
| 2                            | AD26402     | Database Design and Management            | PC          | 3               | 3 | 0 | 0 | 3 | 9,11,12             |
| 3                            | AD26403     | Software Engineering                      | PC          | 2               | 2 | 0 | 0 | 2 | 4,8,9               |
| Lab Integrated Theory Course |             |                                           |             |                 |   |   |   |   |                     |
| 4                            | CS26402     | Computer Networks                         | PC          | 4               | 2 | 0 | 2 | 3 | 4,8,9               |
| 5                            | AD26405     | Machine Learning                          | PC          | 5               | 3 | 0 | 2 | 4 | 4,9,11,16,          |
| Practical Course             |             |                                           |             |                 |   |   |   |   |                     |
| 6                            | AD26411     | Innovation Design Laboratory              | PC          | 2               | 0 | 0 | 2 | 2 | 4,9                 |
| 7                            | AD26412     | Database Design and Management Laboratory | PC          | 3               | 0 | 0 | 3 | 2 | 9,11,12             |

| Employability Enhancement Course |         |                                                   |    |        |    |   |    |    |          |
|----------------------------------|---------|---------------------------------------------------|----|--------|----|---|----|----|----------|
| 8                                | AD26S03 | Employability Enhancement Skill – II              | EE | 2      | 0  | 0 | 2  | 1  | 4,8      |
| 9                                | AD26S04 | Industry Oriented Course-I                        | EE | 2      | 0  | 0 | 2  | 1  |          |
| Mandatory Course                 |         |                                                   |    |        |    |   |    |    |          |
| 10                               | MC26401 | Foreign Language-Basic Level-IV (Japanese/German) | MC | 2      | 0  | 0 | 2  | 1  | 4,8,17   |
| 11                               | MC26402 | Indian Constitution                               | MC | 1      | 1  | 0 | 0  | 0  | 4,16     |
| Audit Course                     |         |                                                   |    |        |    |   |    |    |          |
| 12                               | AC26401 | NSS/YRC/SDG/Club Activities                       | AC | 1 Week | -  | - | -  | 0  | 3, 11,17 |
| <b>TOTAL</b>                     |         |                                                   |    | 30     | 14 | 1 | 15 | 22 |          |

| Semester V                       |             |                                             |             |                 |   |   |   |   |           |
|----------------------------------|-------------|---------------------------------------------|-------------|-----------------|---|---|---|---|-----------|
| S. No                            | Course Code | Course Name                                 | Course Type | Contact Periods | L | T | P | C | SDG       |
| Theory Course                    |             |                                             |             |                 |   |   |   |   |           |
| 1                                | AD26501     | Deep Learning                               | PC          | 3               | 3 | 0 | 0 | 3 | 3,4,9     |
| 2                                |             | Open Elective – I                           | OE          | 3               | 3 | 0 | 0 | 3 |           |
| 3                                |             | Open Elective – II                          | OE          | 3               | 3 | 0 | 0 | 3 |           |
| Lab Integrated Theory Course     |             |                                             |             |                 |   |   |   |   |           |
| 4                                | AD26502     | Cryptography and Security                   | PC          | 4               | 2 | 0 | 2 | 3 | 6,9,13,16 |
| 5                                |             | Professional Elective – I                   | PE          | 4               | 2 | 0 | 2 | 3 |           |
| 6                                | AD26503     | Full Stack Development                      | PC          | 4               | 2 | 0 | 2 | 3 | 4,8,17    |
| Practical Course                 |             |                                             |             |                 |   |   |   |   |           |
| 7                                | AD26511     | Deep Learning Laboratory                    | PC          | 2               | 0 | 0 | 2 | 1 | 3,4,9     |
| 8                                | AD26512     | Innovation Product Development-I Laboratory | PC          | 2               | 0 | 0 | 2 | 2 | 4,8,9, 12 |
| Employability Enhancement Course |             |                                             |             |                 |   |   |   |   |           |
| 9                                | AD26S05     | Career Readiness - I                        | EE          | 2               | 0 | 0 | 2 | 1 | 4, 8      |

| Mandatory Course |         |                              |    |        |    |   |    |    |          |
|------------------|---------|------------------------------|----|--------|----|---|----|----|----------|
| 10               | MC26501 | Disaster Management          | MC | 1      | 1  | 0 | 0  | 0  | 12,13    |
| Audit Course     |         |                              |    |        |    |   |    |    |          |
| 11               | AC26501 | NSS/YRC/SDG/ Club Activities | AC | 1 Week | -  | - | -  | 0  | 3, 11,17 |
| <b>TOTAL</b>     |         |                              |    | 28     | 16 | 0 | 12 | 22 |          |

| For Honours Degree                                         |  |  |    |    |   |   |    |   |                 |
|------------------------------------------------------------|--|--|----|----|---|---|----|---|-----------------|
| Multidisciplinary Project(Capstone Design Project Level I) |  |  | EE | 12 | 0 | 0 | 12 | 6 | 4, 8, 9, 11, 12 |
| <b>(or)</b>                                                |  |  |    |    |   |   |    |   |                 |
| Honours Elective – I                                       |  |  | PE | 4  | 2 | 0 | 2  | 3 |                 |
| Honours Elective – II                                      |  |  | PE | 4  | 2 | 0 | 2  | 3 |                 |
| For Minor Degree                                           |  |  |    |    |   |   |    |   |                 |
| Minor Elective – I                                         |  |  | PC | 3  | 3 | 0 | 0  | 3 |                 |
| Minor Elective – II                                        |  |  | PC | 3  | 3 | 0 | 0  | 3 |                 |

**Semester VI**

| S. No                                                      | Course Code | Course Name                                  | Course Type | Contact Periods | L  | T | P  | C  | SDG              |
|------------------------------------------------------------|-------------|----------------------------------------------|-------------|-----------------|----|---|----|----|------------------|
| Theory Course                                              |             |                                              |             |                 |    |   |    |    |                  |
| 1                                                          | HS266XX     | Management Theory-I                          | HS          | 3               | 3  | 0 | 0  | 3  |                  |
| Lab Integrated Theory Course                               |             |                                              |             |                 |    |   |    |    |                  |
| 2                                                          |             | Professional Elective – II                   | PE          | 4               | 2  | 0 | 2  | 3  |                  |
| 3                                                          |             | Professional Elective - III                  | PE          | 4               | 2  | 0 | 2  | 3  |                  |
| 4                                                          | AD26601     | Gen AI                                       | PC          | 4               | 2  | 0 | 2  | 3  | 6,11             |
| 5                                                          | AD26602     | Cloud Computing Technologies                 | PC          | 4               | 2  | 0 | 2  | 3  | 8,9,12           |
| Practical Course                                           |             |                                              |             |                 |    |   |    |    |                  |
| 6                                                          | AD26611     | Innovation Product Development-II Laboratory | PC          | 4               | 0  | 0 | 4  | 2  | 4,8,9,12         |
| 7                                                          | AD26612     | Internship                                   | EE          | 4 Weeks         |    |   |    | 2  |                  |
| Employability Enhancement Course                           |             |                                              |             |                 |    |   |    |    |                  |
| 8                                                          | AD26S06     | Career Readiness – II                        | EE          | 2               | 0  | 0 | 2  | 1  | 4, 8             |
| 9                                                          | AD26S07     | Industry-Oriented Course-II                  | EE          | 2               | 0  | 0 | 2  | 1  |                  |
| Mandatory Course                                           |             |                                              |             |                 |    |   |    |    |                  |
| 10                                                         | MC26601     | Introduction to Indian Knowledge System      | MC          | 1               | 1  | 0 | 0  | 0  | 4, 11,12         |
| Audit Course                                               |             |                                              |             |                 |    |   |    |    |                  |
| 11                                                         | AC26601     | NSS/YRC/SDG/ Club Activities                 | AC          | 1 Week          | -  | - | -  | 0  | 3, 11,17         |
| TOTAL                                                      |             |                                              |             | 28              | 12 | 0 | 16 | 21 |                  |
| For Honours Degree                                         |             |                                              |             |                 |    |   |    |    |                  |
| Multidisciplinary Project(Capstone Design Project Level I) |             |                                              | EE          | 12              | 0  | 0 | 12 | 6  | 4, 8, 9, 11, 12, |
| (or)                                                       |             |                                              |             |                 |    |   |    |    |                  |
| Honours Elective – III                                     |             |                                              | PE          | 4               | 2  | 0 | 2  | 3  |                  |
| Honours Elective – IV                                      |             |                                              | PE          | 4               | 2  | 0 | 2  | 3  |                  |

|                         |    |   |   |   |   |   |  |
|-------------------------|----|---|---|---|---|---|--|
|                         |    |   |   |   |   |   |  |
|                         |    |   |   |   |   |   |  |
| <b>For Minor Degree</b> |    |   |   |   |   |   |  |
| Minor Elective – III    | PC | 3 | 3 | 0 | 0 | 3 |  |
| Minor Elective – IV     | PC | 3 | 3 | 0 | 0 | 3 |  |

**Semester VII**

| S. No                                   | Course Code | Course Name                                    | Course Type | Contact Periods | L  | T | P  | C  | SDG            |
|-----------------------------------------|-------------|------------------------------------------------|-------------|-----------------|----|---|----|----|----------------|
| <b>Theory Course</b>                    |             |                                                |             |                 |    |   |    |    |                |
| 1                                       | HS26701     | Research and Publication Ethics                | HS          | 2               | 2  | 0 | 0  | 1  | 4,9,16,17      |
| 2                                       |             | Open Elective – III                            | OE          | 3               | 3  | 0 | 0  | 3  |                |
| <b>Lab Integrated Theory Course</b>     |             |                                                |             |                 |    |   |    |    |                |
| 3                                       | AD26702     | Natural Language processing                    | PC          | 4               | 2  | 0 | 2  | 3  | 4,8,9,10,16,17 |
| 4                                       | AD26703     | Prompt Engineering                             | PC          | 4               | 2  | 0 | 2  | 3  | 4,9            |
| 5                                       |             | Professional Elective – 4                      | PE          | 4               | 2  | 0 | 2  | 3  |                |
| 6                                       |             | Professional Elective – 5                      | PE          | 4               | 2  | 0 | 2  | 3  |                |
| <b>Practical Course</b>                 |             |                                                |             |                 |    |   |    |    |                |
| 7                                       | AD26711     | Mini Project/Internship                        | EE          | 4               | 0  | 0 | 4  | 2  |                |
| <b>Employability Enhancement Course</b> |             |                                                |             |                 |    |   |    |    |                |
| 8                                       | AD26S08     | Industry Readiness and Professional Excellence | EE          | 2               | 0  | 0 | 2  | 1  | 4,8,9,12       |
| 9                                       | AD26S09     | Industry Certification Course-II               | EE          | 2               | 0  | 0 | 2  | 1  |                |
| <b>TOTAL</b>                            |             |                                                |             | 29              | 13 | 0 | 16 | 20 |                |

**For Honours Degree**

|                                                            |    |    |   |   |    |   |                   |
|------------------------------------------------------------|----|----|---|---|----|---|-------------------|
| Multidisciplinary Project(Capstone Design Project Level I) | EE | 12 | 0 | 0 | 12 | 6 | 4, 8,9, 11, 12,13 |
|------------------------------------------------------------|----|----|---|---|----|---|-------------------|

**(or)**

|                       |    |   |   |   |   |   |  |
|-----------------------|----|---|---|---|---|---|--|
| Honours Elective – V  | PE | 4 | 2 | 0 | 2 | 3 |  |
| Honours Elective – VI | PE | 4 | 2 | 0 | 2 | 3 |  |

**For Minor Degree**

|                     |    |   |   |   |   |   |  |
|---------------------|----|---|---|---|---|---|--|
| Minor Elective – V  | PC | 3 | 3 | 0 | 0 | 3 |  |
| Minor Elective – VI | PC | 3 | 3 | 0 | 0 | 3 |  |

**Semester VIII**

| <b>S. No</b>            | <b>Course Code</b> | <b>Course Name</b> | <b>Course Type</b> | <b>Contact Periods</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> | <b>SDG</b> |
|-------------------------|--------------------|--------------------|--------------------|------------------------|----------|----------|----------|----------|------------|
| <b>Practical Course</b> |                    |                    |                    |                        |          |          |          |          |            |
| 1                       | AD26811            | Project Work       | EE                 | 16                     | 0        | 0        | 16       | 8        | 4, 9       |
| TOTAL                   |                    |                    |                    | 16                     |          |          | 16       | 8        |            |

### ELECTIVE -MANAGEMENT COURSES

| Code    |                              | Type | Periods |   |   |   |           |
|---------|------------------------------|------|---------|---|---|---|-----------|
| HS26601 | Principles of Management     | HS   | 3       | 3 | 0 | 3 | 8, 9      |
| HS26602 | Total Quality Management     | HS   | 3       | 3 | 0 | 3 | 9, 12     |
| HS26603 | Strategic Management         | HS   | 3       | 3 | 0 | 3 | 8, 12, 17 |
| HS26604 | Business Analytics           | HS   | 3       | 3 | 0 | 3 | 4, 9      |
| HS26605 | Entrepreneurship Development | HS   | 3       | 3 | 0 | 3 | 8, 17     |
| HS26606 | Digital Marketing            | HS   | 3       | 3 | 0 | 3 | 8, 9      |

### PROFESSIONAL ELECTIVE COURSES: VERTICALS

| Vertical I                            | Vertical II              | Vertical III   | Vertical IV           | Vertical V                      |
|---------------------------------------|--------------------------|----------------|-----------------------|---------------------------------|
| Creative Media                        | Embedded Systems and IOT | AI Engineering | Emerging Trends       | Advanced Computing Technologies |
| UI/UX Design                          | IoT in 5G and 6G         | X AI           | Quantum Computing     | Edge Computing                  |
| Multimedia Design                     | Security in IoT          | Ethics in AI   | DevOps                | Fog Computing                   |
| Game Development                      | Smart IoT Architecture   | Security in AI | Vibe Coding           | Human Centered Computing        |
| Augmented Reality/<br>Virtual Reality | AI in IoT                | MLOps          | Robotics              | Green Computing                 |
| Visual Effects                        | Digital Twin Technology  | Agentic AI     | Blockchain Technology | Digital Forensics               |



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## PROFESSIONAL ELECTIVE COURSES: VERTICALS

### VERTICAL I: CREATIVE MEDIA

| S. No | Course Code | Course Name                           | Course Type | Contact Periods | L | T | P | C | SDG    |
|-------|-------------|---------------------------------------|-------------|-----------------|---|---|---|---|--------|
| 1     | AD26CM1     | UI/UX Design                          | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,11 |
| 2     | AD26CM2     | Multimedia Design                     | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,11 |
| 3     | AD26CM3     | Game Development                      | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,11 |
| 4     | AD26CM4     | Augmented Reality/<br>Virtual Reality | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,11 |
| 5     | AD26CM5     | Visual Effects                        | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,11 |

### VERTICAL II: EMBEDDED SYSTEMS AND IOT

| S. No | Course Code | Course Name             | Course Type | Contact Periods | L | T | P | C | SDG    |
|-------|-------------|-------------------------|-------------|-----------------|---|---|---|---|--------|
| 1     | AD26ES1     | IoT in 5G and 6G        | PE          | 4               | 2 | 0 | 2 | 3 | 8,9,11 |
| 2     | AD26ES2     | Security in IoT         | PE          | 4               | 2 | 0 | 2 | 3 | 4,8,9, |
| 3     | AD26ES3     | Smart IoT Architecture  | PE          | 4               | 2 | 0 | 2 | 3 | 8,9,11 |
| 4     | AD26ES4     | AI in IoT               | PE          | 4               | 2 | 0 | 2 | 3 | 3,9    |
| 5     | AD26ES5     | Digital Twin Technology | PE          | 4               | 2 | 0 | 2 | 3 | 4,9    |

### VERTICAL III: AI Engineering

| S. No | Course Code | Course Name    | Course Type | Contact Periods | L | T | P | C | SDG         |
|-------|-------------|----------------|-------------|-----------------|---|---|---|---|-------------|
| 1     | AD26AA1     | X AI           | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,16      |
| 2     | AD26AA2     | Ethics in AI   | PE          | 3               | 2 | 0 | 2 | 3 | 4,8,9       |
| 3     | AD26AA 3    | Security in AI | PE          | 3               | 2 | 0 | 2 | 3 | 4,9,11,16   |
| 4     | AD26AA4     | MLops          | PE          | 4               | 2 | 0 | 2 | 3 | 4,8,9,11,16 |
| 5     | AD26AA5     | Agentic AI     | PE          | 4               | 2 | 0 | 2 | 3 | 4,9,16      |

### VERTICAL IV: EMERGING TRENDS

| S. No | Course Code | Course Name           | Course Type | Contact Periods | L | T | P | C | SDG            |
|-------|-------------|-----------------------|-------------|-----------------|---|---|---|---|----------------|
| 1     | AD26IET1    | Quantum Computing     | PE          | 4               | 2 | 0 | 2 | 3 | 4,8,9,13,16,17 |
| 2     | AD26ET2     | DevOps                | PE          | 4               | 2 | 0 | 2 | 3 | 4,8,9          |
| 3     | AD26ET3     | Vibe Coding           | PE          | 4               | 2 | 0 | 2 | 3 | 4,8            |
| 4     | AD26ET4     | Robotics              | PE          | 3               | 2 | 0 | 2 | 3 | 4,9            |
| 5     | AD26ET5     | Blockchain Technology | PE          | 3               | 2 | 0 | 2 | 3 | 8,9,16         |



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## **OPEN ELECTIVES**

### **OPEN ELECTIVE - I**

| S. No | Course Code | Course Name                              | Course Type | Contact Periods | L | T | P | C | SDG        |
|-------|-------------|------------------------------------------|-------------|-----------------|---|---|---|---|------------|
| 1     | OE26C01     | Environment and social impact Assessment | OE          | 3               | 3 | 0 | 0 | 3 | 11, 13, 15 |
| 2     | OE26C02     | Data Communication                       | OE          | 3               | 3 | 0 | 0 | 3 | 9,17       |
| 3     | OE26C03     | Renewable energy Systems                 | OE          | 3               | 3 | 0 | 0 | 3 | 7, 9, 13   |
| 4     | OE26C04     | E-Vehicle                                | OE          | 3               | 3 | 0 | 0 | 3 | 7, 11, 13  |
| 5     | OE26C05     | Holistic Nutrition                       | OE          | 3               | 3 | 0 | 0 | 3 | 2, 3       |
| 6     | OE26C06     | NGOs and Sustainable Development         | OE          | 3               | 3 | 0 | 0 | 3 | 1, 10, 17  |
| 7     | OE26C07     | Robotic process Automation               | OE          | 3               | 3 | 0 | 0 | 3 | 8, 9, 12   |
| 8     | OE26C08     | Biotechnology in Health Care             | OE          | 3               | 3 | 0 | 0 | 3 | 2, 3, 9    |
| 9     | OE26C09     | Space Science                            | OE          | 3               | 3 | 0 | 0 | 3 | 4, 9       |

|    |         |                                                        |    |   |   |   |   |   |          |
|----|---------|--------------------------------------------------------|----|---|---|---|---|---|----------|
|    |         |                                                        |    |   |   |   |   |   |          |
| 10 | OE26C10 | Introduction to Industrial Engineering                 | OE | 3 | 3 | 0 | 0 | 3 | 8, 9, 12 |
| 11 | OE26C11 | Food, Nutrition and Health                             | OE | 3 | 3 | 0 | 0 | 3 | 2, 3     |
| 12 | OE26C12 | Introduction to Industrial Instrumentation and control | OE | 3 | 3 | 0 | 0 | 3 | 9, 12    |
| 13 | OE26C13 | Graph Theory                                           | OE | 3 | 3 | 0 | 0 | 3 | 4, 9     |
| 14 | OE26C14 | IT in Agricultural Systems                             | OE | 3 | 3 | 0 | 0 | 3 | 2, 9, 15 |
| 15 | OE26C15 | Digital Payment Systems                                | OE | 3 | 3 | 0 | 0 | 3 | 8, 9,10  |

### OPEN ELECTIVE – II

| S. No | Course Code | Course Name                             | Course Type | Contact Periods | L | T | P | C | SDG       |
|-------|-------------|-----------------------------------------|-------------|-----------------|---|---|---|---|-----------|
| 1     | OE26C16     | Project Report Writing                  | OE          | 3               | 3 | 0 | 0 | 3 | 4, 17     |
| 2     | OE26C17     | Sensors and Actuators                   | OE          | 3               | 3 | 0 | 0 | 3 | 9, 11, 12 |
| 3     | OE26C18     | Drone Technology                        | OE          | 3               | 3 | 0 | 0 | 3 | 2,9,15    |
| 4     | OE26C19     | Life Style Diseases                     | OE          | 3               | 3 | 0 | 0 | 3 | 3,4,11    |
| 5     | OE26C20     | Concepts in Mobile Robots               | OE          | 3               | 3 | 0 | 0 | 3 | 8,9,12    |
| 6     | OE26C21     | Cost Management of Engineering Projects | OE          | 3               | 3 | 0 | 0 | 3 | 8, 12     |

|    |         |                                                  |    |   |   |   |   |   |             |
|----|---------|--------------------------------------------------|----|---|---|---|---|---|-------------|
| 7  | OE26C22 | Industrial Nano technology                       | OE | 3 | 3 | 0 | 0 | 3 | 3,9,12      |
| 8  | OE26C23 | Resource Management Techniques                   | OE | 3 | 3 | 0 | 0 | 3 | 6,7,12,13   |
| 9  | OE26C24 | Fintech Regulation                               | OE | 3 | 3 | 0 | 0 | 3 | 1, 8, 9, 10 |
| 10 | OE26C25 | Introduction to Control Engineering              | OE | 3 | 3 | 0 | 0 | 3 | 4,7, 9, 12  |
| 11 | OE26C26 | Pharmaceutical Nanotechnology                    | OE | 3 | 3 | 0 | 0 | 3 | 3,6,9,12    |
| 12 | OE26C27 | Aviation Management                              | OE | 3 | 3 | 0 | 0 | 3 | 8,9,11,13   |
| 13 | OE26C28 | AI for Business and Society                      | OE | 3 | 3 | 0 | 0 | 3 | 4,8, 9,16   |
| 14 | OE26C29 | Digital Twin Technology and Industrial Metaverse | OE | 3 | 3 | 0 | 0 | 3 | 7,9,11,12   |
| 15 | OE26C30 | Cyber Loss and Digital Forensics                 | OE | 3 | 3 | 0 | 0 | 3 | 5,8,16,17   |



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### Credit Distribution

| S. No        | Subject Area                          | Credit Per Semester |    |     |    |    |    |     |      | Credits Total | Percentage |
|--------------|---------------------------------------|---------------------|----|-----|----|----|----|-----|------|---------------|------------|
|              | Semester                              | I                   | II | III | IV | V  | VI | VII | VIII |               |            |
| 1            | Humanities and Social Science (HS)    | 3                   | 6  | 0   | 0  | 0  | 3  | 1   | 0    | 12            | 7.40       |
| 2            | Basic Science Course (BS)             | 7                   | 7  | 4   | 0  | 0  | 0  | 0   | 0    | 18            | 11.11      |
| 3            | Engineering Science Course (ES)       | 9                   | 9  | 0   | 0  | 0  | 0  | 0   | 0    | 18            | 11.11      |
| 4            | Employability Enhancement Course (EE) | 1                   | 1  | 2   | 2  | 1  | 4  | 4   | 8    | 23            | 14.19      |
| 5            | Open Elective (OE)                    | 0                   | 0  | 0   | 0  | 6  | 0  | 3   | 0    | 9             | 5.55       |
| 6            | Professional Course (PC)              | 0                   | 0  | 14  | 19 | 12 | 8  | 7   | 0    | 60            | 37.65      |
| 7            | Professional Elective (PE)            | 0                   | 0  | 0   | 0  | 3  | 6  | 6   | 0    | 15            | 9.25       |
| 8            | Mandatory Course (MC)                 | 1                   | 1  | 3   | 1  | 0  | 0  | 0   | 0    | 6             | 3.70       |
| 9            | Audit Course (AC)                     | 0                   | 0  | 0   | 0  | 0  | 0  | 0   | 0    | 0             | 0.00       |
| <b>Total</b> |                                       | 21                  | 24 | 23  | 22 | 22 | 21 | 20  | 8    | 161           | 100.0%     |



## **ENROLLMENT FOR B.E. (HONOURS) / MINOR DEGREE (OPTIONAL)**

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.



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### VERTICALS FOR MINOR DEGREE

| S. No | Minor Degree: APPLIED<br>ARTIFICIAL<br>INTELLIGENCE |
|-------|-----------------------------------------------------|
| 1     | Basics of Artificial Intelligence                   |
| 2     | Machine Learning Concepts and Applications          |
| 3     | Deep Learning Essentials                            |
| 4     | Big Data Management for Engineers & AI Integration  |
| 5     | Building AI Products                                |
| 6     | Gen AI Tools                                        |
| 7     | Basics of Prompt Engineering                        |
| 8     | Ethics in AI                                        |

### VERTICAL: APPLIED ARTIFICIAL INTELLIGENCE

| S. No | Course Code | Course Name                                        | Course Type | Contact Periods | L | T | P | C | SDG           |
|-------|-------------|----------------------------------------------------|-------------|-----------------|---|---|---|---|---------------|
| 1     | AD26AI1     | Basics of Artificial Intelligence                  | PC          | 3               | 3 | 0 | 0 | 3 | 8,9           |
| 2     | AD26AI2     | Machine Learning Concepts and Applications         | PC          | 3               | 3 | 0 | 0 | 3 | 4,8,9         |
| 3     | AD26AI3     | Deep Learning Essentials                           | PC          | 3               | 3 | 0 | 0 | 3 | 3,4,8,9,11,13 |
| 4     | AD26AI4     | Big Data Management for Engineers & AI Integration | PC          | 3               | 3 | 0 | 0 | 3 | 4,9,11,12,16  |
| 5     | AD26AI5     | Building AI Products                               | PC          | 3               | 3 | 0 | 0 | 3 | 8,9           |
| 6     | AD26AI6     | Gen AI Tools                                       | PC          | 3               | 3 | 0 | 0 | 3 | 4,9           |
| 7     | AD26AI7     | Basics of Prompt Engineering                       | PC          | 3               | 3 | 0 | 0 | 3 | 4,8,9,16      |
| 8     | AD26AI8     | Ethics in AI                                       | PC          | 3               | 3 | 0 | 0 | 3 | 4,9,10,16     |

**BOS CHAIRMAN/AIDS**

Chairman

Board of Studies

Department of Artificial Intelligence and Data Science

B.TECH AIDS Kingston Engineering College R-2026 CURRICULUM

Phone: 632 059

**PRINCIPAL**  
**PRINCIPAL**

Kingston Engineering College

Chittoor Main Road, V31185-632 059.

Phone: 0416-2298300



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |          |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------|----------|----------|----------|
| <b>CS26C01</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>PROGRAMMING IN C</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>SDG 4,8,9</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         | 3        | 0        | 2        | 4        |
| <b>Course Objectives:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         |          |          |          |          |
| Students should able, <ul style="list-style-type: none"><li>• Explain the fundamental concepts of programming and describe the structure and syntax of the C programming language.</li><li>• Apply fundamental programming constructs, including variables, data types, operators, decision-making, and iterative statements, to develop simple C programs.</li><li>• Develop modular C programs using functions, arrays, strings, pointers, and structures to analyze and solve computational problems.</li><li>• Implement file handling and dynamic memory allocation techniques to manage and organize data efficiently in C programs.</li><li>• Design, develop, debug, evaluate, and execute C programs to solve real-world computational problems using structured programming principles.</li></ul> |                         |          |          |          |          |
| <b>UNIT I INTRODUCTION TO C</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |          |          |          | <b>9</b> |
| Introduction to programming paradigms: Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode – Applications of C Language - Structure of C program –Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/ Output Statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Built-in Functions.                                                                                                                                                                                                                           |                         |          |          |          |          |
| <b>UNIT II ARRAYS AND STRINGS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         |          |          |          | <b>9</b> |
| Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays and Multi-dimensional Arrays, Array operations and traversals - String declaration, input/output, string library functions and String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |          |          |          |          |
| <b>UNIT III FUNCTIONS AND POINTERS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |          |          |          | <b>9</b> |
| Functions: Function prototype ,Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.Pointers: Pointer operators, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         |          |          |          |          |
| <b>UNIT IV STRUCTURE AND UNION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         |          |          |          | <b>9</b> |
| Structure - Nested structures – Array of structures - Pointer to Structures – Self-referential structures. Union – Enumerations- Storage classes and Visibility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |          |          |          |          |

**UNIT V FILE PROCESSING AND STANDARD LIBRARIES****9**

Files – Types of file processing: Sequential access, Random access – Sequential, File Operations: Open, read, write, close file operations - Binary vs Text files - File pointers - Error handling in file operations - Command line arguments. Standard Libraries & Header Files: Using standard libraries (stdio.h, stdlib.h, string.h, math.h) - Creating and using user-defined header files and libraries.

**LIST OF EXPERIMENTS:**

1. Create Problem Analysis Charts, Flowcharts and Pseudocode and Implement a simple C program.
2. To develop C programs by applying decision-making and looping statements.

3. To develop simple C programs using arrays.
4. To develop simple C programs using string I/O Libraries and string operations.
5. Implement Selection sort using C.
6. Implement linear and binary search using C.
7. To develop simple C programs using build in functions and user defined functions.
8. implement Binary Search using recursive functions
9. To develop a Program to Display Value Using Pointer.
10. To develop a Program to Add Two Numbers Using Pointers.
11. To develop a Program to Swap Two Numbers Using Pointers.
12. Implement Linked list concept using pointers.
13. Develop simple C programs using structure and union
14. Implement Dynamic memory allocation.
15. To develop C programs using file operations.
16. To develop C programs using user-defined header files and libraries for modular programming.

**THEORY:45  
HOURS PRACTICAL:  
30 HOURS**

**TOTAL: 75 HOURS**

**Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%**

**Assessment Methodology: Internal Assessment: 30%, Project/Practical based Learning (10%), Assignments (10%).**

**Course Outcomes:** At the end of the course, the student will be able to

**CO1:** Explain and apply the fundamentals of C programming, including data types, operators, expressions, and control structures and to solve simple problems.

**CO2:** Develop C programs using arrays and strings for data representation and manipulation.

**CO3:** Analyze computational problems and implement solutions using functions and pointers.

**CO4:** Apply structures to design modular and efficient solutions for real-world programming problems.

**CO5:** Implement file handling and dynamic memory allocation techniques to efficiently manage data in C applications.

**TEXT BOOKS:**

1. Reema Thareja R. (2023). "Programming in C", Third Edition, Oxford University Press.
2. Balagurusamy, E. (2024), "Programming in ANSI C", 9<sup>th</sup> Edition, McGraw Hill Education.
3. Kanetkar, Y.P. (2020). "Let Us C", (17th ed.). BPB Publications.

**REFERENCES BOOKS:**

1. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.
2. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
3. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.

**ONLINE RESOURCES:**

1. <https://www.nptel.ac.in/>
2. <https://www.coursera.org/>
3. <https://www.udemy.com/>

### CO's-PO's & PSO's Mapping

| COs     | PO1  | PO2  | PO3  | PO4  | PO5  | PO6  | PO7  | PO8  | PO9  | PO1<br>0 | PO1<br>1 | PSO1 | PSO<br>2 | PSO<br>3 |
|---------|------|------|------|------|------|------|------|------|------|----------|----------|------|----------|----------|
| C01     | 3    | 2    | 1    | –    | 2    | –    | –    | –    | –    | –        | 2        | 2    | 2        | –        |
| C02     | 3    | 3    | 2    | –    | 3    | –    | –    | –    | –    | –        | 2        | 3    | 2        | –        |
| C03     | 3    | 3    | 2    | 2    | 3    | –    | –    | –    | –    | –        | 2        | 3    | 3        | –        |
| C04     | 3    | 3    | 3    | 2    | 2    | –    | –    | –    | 2    | –        | 2        | 3    | 3        | 2        |
| C05     | 3    | 2    | 2    | 2    | 3    | –    | –    | –    | –    | –        | 2        | 3    | 3        | 2        |
| Average | 3.00 | 2.60 | 2.00 | 1.20 | 2.60 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00     | 2.00     | 2.80 | 2.60     | 0.80     |

1-Low, 2-Medium, 3-High

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                |   |   |   |   |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---|---|---|---|----------|
| AD26201                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Data Structures and Algorithms | L | T | P | C | SDG      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                | 3 | 0 | 2 | 4 | 4,8,9,17 |
| <b>Pre-requisite:</b><br>Students should have basic knowledge in the following areas: <ul style="list-style-type: none"><li>Basic knowledge of C Programming and Problem-Solving techniques.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                |   |   |   |   |          |
| <b>Course Objectives</b><br>After successful completion of the course, students will be able to: <ol style="list-style-type: none"><li>Understand the fundamentals of data structures and algorithms.</li><li>Develop efficient programs using the C programming language.</li><li>Analyze algorithm complexity and performance.</li><li>Apply suitable data structures for solving real-world problems.</li><li>Design scalable solutions for modern computing and AI applications.</li></ol>                                                                                                                                                                               |                                |   |   |   |   |          |
| <b>UNIT I – FOUNDATIONS OF DATA STRUCTURES AND ALGORITHMS</b><br>Introduction to Data Structures -Data Types and Abstract Data Types (ADT) - Review of C Programming Concepts -Algorithm Design Fundamentals - Characteristics of Algorithms -Time and Space Complexity -Asymptotic Notations (Big O, Omega, Theta) -Recursion and Recursive Algorithms<br><b>Activities:</b> <ol style="list-style-type: none"><li>Develop a program to analyze the time complexity of iterative and recursive algorithms and compare their execution time.</li><li>Implement recursive and iterative solutions for finding GCD and Fibonacci series an analyze their efficiency.</li></ol> |                                |   |   |   |   |          |
| <b>UNIT II – LINEAR DATA STRUCTURES</b><br>Arrays and Applications -Sparse Matrices -Strings and String Operations -Linked Lists: Singly Linked List, Doubly Linked List, Circular Linked List-Stack ADT - Queue ADT -Priority Queue - Applications of Stacks and Queues<br><b>Activities:</b> <ol style="list-style-type: none"><li>Implement a menu-driven application using Stack and Queue operations for real-world scenarios such as browser history or task scheduling.</li><li>Develop an expression evaluation system using Stack for infix-to-postfix conversion and postfix evaluation.</li></ol>                                                                 |                                |   |   |   |   |          |
| <b>UNIT III – NON-LINEAR DATA STRUCTURES</b><br>Trees and Terminology-Binary Trees -Binary Search Trees -AVL Trees -Heap Structures - Graph Fundamentals -Graph Representations -Graph Traversals: BFS, DFS<br><b>Activities:</b> <ol style="list-style-type: none"><li>Implement Binary Search Tree operations (Insertion, Deletion, Traversal) and compare their performance.</li><li>Implement Graph Traversal algorithms (BFS and DFS) for social network or route navigation applications.</li></ol>                                                                                                                                                                    |                                |   |   |   |   |          |

#### **UNIT IV – ALGORITHM DESIGN TECHNIQUES**

Divide and Conquer -Greedy Method-Dynamic Programming -Backtracking - Branch and Bound -Searching Algorithms: Linear Search, Binary Search -Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort.

##### **Activities:**

1. Implement and compare the performance of Sorting Algorithms (Bubble/Selection, Insertion/Merge/Quick/Heap Sort) using datasets of varying sizes.
2. Develop solutions using Dynamic Programming and Greedy techniques for optimization problems such as Knapsack and Activity Selection.

#### **UNIT V – ADVANCED DATA STRUCTURES AND INDUSTRY 4.0 APPLICATIONS**

Hashing Techniques -Collision Resolution Methods -Trie Data Structure -Disjoint Sets

-Introduction to Data Structures in AI and Machine Learning -Data Structures for Big Data Analytics -Graph Analytics -Data Structures in IoT Systems -Emerging Trends in Algorithm Engineering.

##### **Activities:**

1. Mini-project: Student Record Management System using Data Structures.
2. Route optimization using graph algorithms.

**TOTAL: 75 HOURS**

**Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%**

**Assessment Methodology: Internal Assessment: 10%,  
Project/Practical based Learning (10%), Assignments (10%). Quiz – 10 /Virtual Demo – 10,  
Flipped Classroom – 10, /Review of GATE Questions – 10**

##### **Course Outcomes**

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

**CO1:** Explain fundamental concepts of data structures, algorithms, and complexity analysis.

**CO2:** Implement linear data structures using C programming.

**CO3:** Apply non-linear data structures to solve computational problems.

**CO4:** Design efficient algorithms using appropriate algorithmic strategies.

**CO5:** Analyze and develop data structure-based solutions for Industry 4.0 applications.

## SOFTWARE TOOLS

- GCC Compiler
- Code: Blocks
- Dev C++
- Visual Studio Code
- Online GDB
- GitHub

## TEXT BOOK

1. Horowitz, E., Sahni, S., & Anderson-Freed, S. (2008). Fundamentals of data structures in C (2nd ed.). Universities Press.
2. Reema Thareja. (2022). Data structures using C (3rd ed.). Oxford University Press.
3. Weiss, M. A. (2014). Data structures and algorithm analysis in C (2nd ed.). Pearson Education..

## Reference Books

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2. Lipschutz, S. (2017). Data structures with C. McGraw-Hill Education.
3. Goodrich, M. T., Tamassia, R., & Goldwasser, M. H. (2015). Data structures and algorithms in C++ (2nd ed.). Wiley.
4. Skiena, S. S. (2020). The algorithm design manual (3rd ed.). Springer.

## Online Resources:

1. <https://nptel.ac.in/courses>
2. <https://swayam.gov.in>
3. <https://www.geeksforgeeks.org/data-structures/>
4. <https://www.programiz.com/dsa>
5. <https://visualgo.net/en>

## CO-PO-PSO Mapping

| CO                                             | PO  |     |   |     |     |     |     |     |     |     |     | PSO |   |     |
|------------------------------------------------|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|
|                                                | 1   | 2   | 3 | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 1   | 2 | 3   |
| 1                                              | 3   | 2   | - | 1   | 1   | -   | -   | -   | -   | -   | -   | 2   | 3 | 1   |
| 2                                              | 3   | 3   | 2 | 2   | 3   | -   | -   | -   | -   | 1   | -   | 1   | 3 | 3   |
| 3                                              | 3   | 3   | 2 | 3   | 2   | -   | -   | -   | -   | -   | -   | 1   | 3 | 2   |
| 4                                              | 2   | 3   | 3 | 3   | 3   | -   | -   | -   | 1   | 1   | 1   | 2   | 3 | 3   |
| 5                                              | 2   | 3   | 3 | 3   | 3   | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 3 | 3   |
| Avg                                            | 2.6 | 2.8 | 2 | 2.4 | 2.4 | 0.2 | 0.2 | 0.2 | 0.4 | 0.6 | 0.4 | 0.6 | 3 | 2.4 |
| Low (1); Medium (2); High (3); -no correlation |     |     |   |     |     |     |     |     |     |     |     |     |   |     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |          |          |          |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------|----------|----------|----------|
| <b>CS26C02</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>PYTHON PROGRAMMING</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>SDG 4,8,9,12</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           | <b>3</b> | <b>0</b> | <b>2</b> | <b>4</b> |
| <b>Course Objectives:</b><br>After successful completion of this course, students will be able to: <ul style="list-style-type: none"><li>• Explain the fundamental concepts of Python programming, including computational thinking, language syntax, data types, operators, expressions, and control flow statements.</li><li>• Apply Python data structures such as lists, tuples, dictionaries, arrays, and strings to develop solutions for computational problems.</li><li>• Develop Python programs using conditional statements, iterative constructs, functions, recursion, and variable scope to solve real-world problems.</li><li>• Implement modular Python programs using NumPy arrays, string manipulation techniques, and lambda functions for efficient data processing.</li><li>• Design and develop Python applications using file handling and exception handling techniques to efficiently manage data and solve real-time computational problems.</li></ul> |                           |          |          |          |          |
| <b>UNIT I INTRODUCTION TO PYTHON</b> <b>8</b><br>What is Python, Features of Python, Python Installation and Execution ,Python Interpreter, Python language basics: Language Semantics, Data Types, Variables, Basic Functions, Operators, Flow Control Statements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           |          |          |          |          |
| <b>UNIT II DATA TYPES, EXPRESSIONS AND STATEMENTS</b> <b>9</b><br>Data Types – int, float, Boolean, complex, Strings, precedence of operators, Type Conversion and Comments Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |          |          |          |          |
| <b>UNIT III CONTROL FLOW AND FUNCTIONS</b> <b>9</b><br>Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Variables and Naming Conventions. Functions: Introduction to Functions, Defining and Calling Functions, Parameters and Arguments, Types of Function Arguments – Positional Arguments, Keyword Arguments, Default Arguments, Variable-Length Arguments, Scope of Variables – Local and Global Variables, Return Statements and Fruitful Functions, Recursive Functions                                                                                                                                                                                                                                                                                                                                                                       |                           |          |          |          |          |

**UNIT IV ARRAYS , STRINGS AND MODULAR PROGRAMMING 10**

Introduction to Arrays, Array Operations, Indexing and Slicing, Types of Arrays, Lists as arrays; Strings: String Operations : string slices, immutability, string functions and methods, string module Introduction to NumPy, Creating NumPy Arrays, Array Manipulation. Anonymous or Lambda Functions, Applications of Lambda Function.

**UNIT V FILE HANDLING AND EXCEPTION HANDLING 9**

Introduction to Files, Text and Binary Files, File Access Modes, Reading and Writing Files, File

Input/Output Functions, Introduction to Errors and Exceptions, Types of Errors, Exception Handling using try-except, Multiple Exceptions, finally and raise statements.

**LIST OF EXPERIMENTS:**

1. Identify and solve simple real-life, scientific, or technical problems and develop flowcharts for the same (e.g., electricity billing, retail shop billing, sine series, weight calculation of a motorbike, weight of a steel bar, computation of electrical current in a three-phase AC circuit, etc.).
2. Develop a Python program to determine the largest of two numbers.
3. Develop a Python program to check whether a given number is even or odd.
4. Implement a Python program to calculate the factorial of a number using recursion.
5. Develop Python programs to perform list operations such as append, insert, and remove.
6. Develop Python programs to create, access, and manipulate dictionaries.
7. Implement Python programs using list comprehension to generate squares of numbers.
8. Solve scientific and computational problems using conditional and iterative statements (e.g., number series, number patterns, pyramid patterns).
9. Develop a Python program to determine the largest of three numbers using if-elif-else statements.
10. Implement a Python program to calculate the sum of the first  $n$  natural numbers using a while loop.
11. Develop Python programs to demonstrate functions with positional, keyword, and default arguments.
12. Implement Python programs to perform array operations such as

indexing and slicing.

13. Develop Python programs to demonstrate string operations and built-in string methods.
14. (a) Implement Python programs to handle division-by-zero exceptions using try-except blocks.  
(b) Implement the Python program to validate voter age.  
(c) Implement the Python program to validate student mark range.
15. Develop Python programs to handle multiple exceptions using finally blocks.
16. Design and implement a real-time record management system (such as a Student, Employee Payroll, Library, Banking, Examination Result, or Hotel Reservation System) using C file handling functions to create, store, retrieve, update, and manage records efficiently.

**THEORY: 45 HOURS**

**PRACTICAL: 30 HOURS**

**TOTAL: 75 HOURS**

**Course Outcomes**

Upon successful completion of the course, the students will be able to:

**C01:** Explain the concepts of computational thinking, algorithms, flowcharts, Python syntax, data types, operators, expressions, and control flow statements to solve computational problems.

**C02:** Develop Python programs using lists, tuples, dictionaries, list comprehensions, arrays, and strings to solve scientific and computational problems.

**C03:** Apply conditional statements, iterative constructs, functions, recursion, and variable scope concepts to develop Python programs for problem solving.

**C04:** Implement Python programs using NumPy arrays, string manipulation techniques, and lambda functions for modular programming and efficient data processing.

**C05:** Design and develop Python applications using file handling and exception handling techniques to create real-time record management systems and solve technical problems.

**Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%**

**Assessment Methodology: Internal Assessment: 20%, Project/Practical based Learning :**

**20%, Assignments: 10%**

**TEXT BOOKS:**

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.
3. Reema Thareja, *Python Programming Using Problem Solving Approach*, Oxford University Press, 3rd Edition, 2025.

**REFERENCE BOOKS:**

1. Eric Matthes, *Python Crash Course*, No Starch Press, 3rd Edition.
2. Al Sweigart, *Automate the Boring Stuff with Python*, No Starch Press, 3rd Edition.
3. Paul Barry, *Head First Python*, O'Reilly Media, 2nd Edition.
4. Mark Lutz, *Learning Python*, O'Reilly Media, 5th Edition.
5. Allen B. Downey, *Think Python: How to Think Like a Computer Scientist*, Green Tea Press.

**ONLINE RESOURCES:**

1. <https://www.w3schools.com/python/>
2. <https://docs.python.org/3/>
3. <https://www.geeksforgeeks.org/python-programming-language/>

**BOS CHAIRMAN/AIDS**

**PRINCIPAL**

|         |                                |   |   |   |   |          |
|---------|--------------------------------|---|---|---|---|----------|
| AD26201 | Data Structures and Algorithms | L | T | P | C | SDG      |
|         |                                | 3 | 0 | 2 | 4 | 4,8,9,17 |

**Pre-requisite:**

Students should have basic knowledge in the following areas:

- Basic knowledge of C Programming and Problem-Solving techniques.

**Course Objectives**

After successful completion of the course, students will be able to:

1. Understand the fundamentals of data structures and algorithms.
2. Develop efficient programs using the C programming language.
3. Analyze algorithm complexity and performance.
4. Apply suitable data structures for solving real-world problems.
5. Design scalable solutions for modern computing and AI applications.

**UNIT I – FOUNDATIONS OF DATA STRUCTURES AND ALGORITHMS**

Introduction to Data Structures -Data Types and Abstract Data Types (ADT) - Review of C Programming Concepts -Algorithm Design Fundamentals - Characteristics of Algorithms -Time and Space Complexity -Asymptotic Notations (Big O, Omega, Theta) -Recursion and Recursive Algorithms

**Activities:**

1. Develop a program to analyze the time complexity of iterative and recursive algorithms and compare their execution time.
2. Implement recursive and iterative solutions for finding GCD and Fibonacci series and analyze their efficiency.

**UNIT II – LINEAR DATA STRUCTURES**

Arrays and Applications -Sparse Matrices -Strings and String Operations -Linked Lists: Singly Linked List, Doubly Linked List, Circular Linked List-Stack ADT - Queue ADT -Priority Queue - Applications of Stacks and Queues

**Activities:**

1. Implement a menu-driven application using Stack and Queue operations for real-world scenarios such as browser history or task scheduling.
2. Develop an expression evaluation system using Stack for infix-to-postfix conversion and postfix evaluation.

**UNIT III – NON-LINEAR DATA STRUCTURES**

Trees and Terminology-Binary Trees -Binary Search Trees -AVL Trees -Heap Structures - Graph Fundamentals -Graph Representations -Graph Traversals: BFS, DFS

**Activities:**

1. Implement Binary Search Tree operations (Insertion, Deletion, Traversal) and compare their performance.
2. Implement Graph Traversal algorithms (BFS and DFS) for social network or route navigation applications.

**UNIT IV – ALGORITHM DESIGN TECHNIQUES**

Divide and Conquer -Greedy Method-Dynamic Programming -Backtracking - Branch and Bound -Searching Algorithms: Linear Search, Binary Search -Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort.

**Activities:**

1. Implement and compare the performance of Sorting Algorithms (Bubble/Selection, Insertion/Merge/Quick/Heap Sort) using datasets of varying sizes.
2. Develop solutions using Dynamic Programming and Greedy techniques for optimization problems such as Knapsack and Activity Selection.

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Chairman

Board of Studies

Department of Artificial Intelligence and Data Science  
Kingston Engineering College  
Vellore

**Reference Books**

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**CO-PO-PSO Mapping**

| CO                                             | PO  |     |   |     |     |     |     |     |     |     |     | PSO |   |     |
|------------------------------------------------|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|
|                                                | 1   | 2   | 3 | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 1   | 2 | 3   |
| 1                                              | 3   | 2   | - | 1   | 1   | -   | -   | -   | -   | -   | -   | 2   | 3 | 1   |
| 2                                              | 3   | 3   | 2 | 2   | 3   | -   | -   | -   | -   | 1   | -   | 1   | 3 | 3   |
| 3                                              | 3   | 3   | 2 | 3   | 2   | -   | -   | -   | -   | -   | -   | 1   | 3 | 2   |
| 4                                              | 2   | 3   | 3 | 3   | 3   | -   | -   | -   | 1   | 1   | 1   | 2   | 3 | 3   |
| 5                                              | 2   | 3   | 3 | 3   | 3   | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 3 | 3   |
| Avg                                            | 2.6 | 2.8 | 2 | 2.4 | 2.4 | 0.2 | 0.2 | 0.2 | 0.4 | 0.6 | 0.4 | 0.6 | 3 | 2.4 |
| Low (1); Medium (2); High (3); -no correlation |     |     |   |     |     |     |     |     |     |     |     |     |   |     |

  
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