*Dr. D. Y. Patil Educational Federation's*

**Dr. D. Y. Patil College of Engineering and Innovation**

APPROVED BY AICTE, RECOGNIZED BY GOVT. OF MAHARASHTRA,

AUTONOMOUS INSTITUTE AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY

Accredited by NAAC with "A" Grade

# *ACADEMIC COURSE STRUCTURE*

## SY, TY, B. Tech.

## Artificial Intelligence and Data Science (AI-DS)

### B. Tech. 4 YEAR UG COURSE

**(Applicable for the batches admitted from AY 2025-2026 at FY)**

**Dr. D. Y. Patil College of Engineering & Innovation**

Survey No. 27/A/1/2C, Varale Campus,

Near Talegaon Railway Station,

Tal. Maval, Dist. Pune 410 507,

Ph: 020 48522561, 565,566

Web Site: https://www.dypcoei.edu.in,

Email: principal.dypcoei@dypatilef.com

# Vision and Mission of the Institute

## Vision of DYPCOEI

To achieve excellence in quality education through value based rapidly changing technologies and create technical Human-Resource with proficiencies of accepting new challenges.

## Mission of DYPCOEI

**M1:** Continuously strive to impart value-based education to elevate the satisfaction level of all stakeholders.

**M2:** Take dedicated efforts to create competent professionals by effective teaching learning process with passion of lifelong learning attitude.

**M3:** Our endeavour is to promote and support innovative research, entrepreneurship and development activities through Industry Interaction.

# Vision and Mission of the Department

## Vision of Department

To prepare globally acceptable professionals in the field of Artificial Intelligence and Data Science having a desire to learn latest technologies, innovate and ethically progress.

## Mission of Department

**M1:** Impart Value-base education by effective Teaching-Learning process to enhance the concepts Artificial Intelligence and Data Science.

**M2:** Prepare AI and DS professionals to put their efforts in determining solutions for complex engineering problems of the society.

**M3:** Inspire faculty and students to develop innovatively through continuous research activities.

## Program Educational Objectives (PEOs)

**PEO1:** Prepare graduates who will be able to apply the concepts of Machine Learning and Data Science while deriving solutions for real-life problems.

**PEO2:** Inculcate ability of communication, soft skills, ethics and work in a team while demonstrating the professionalism in the corporate world.

**PEO3:** Impart life-long learning among faculty and students to adapt new trends and technologies in the field of Artificial Intelligence and Data Science.

**PEO4:** Inculcate research ability among faculty & students while understanding, analysing the problems and designing solutions innovatively.

# Knowledge and Attitude Profile (WK)

A Knowledge and Attitude Profile (KAP), often represented as WK (Knowledge and Attitude Profile) in some contexts, is a framework or assessment tool used to evaluate an individual's knowledge and attitudes related to a specific area, topic, or domain

**WK1:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

**WK2:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

**WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

**WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

**WK5:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

**WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

**WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

**WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

**WK9:** Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

# Program Outcomes (POs)

**PO1:** **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

**PO2:** **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

**PO3:** **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

**PO4:** **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

**PO5:** **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

**PO6:** **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

**PO7:** **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

**PO8:** **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**PO9:** **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

**PO10:** **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**PO11:** **Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

# Program Specific Outcomes (PSOs)

**PSO1:** Enhance understanding of fundamental theory and concepts of Machine Learning, Data Science and Deep Learning.

**PSO2:** Rigorous hand-on training to enhance the skills in emerging trends and technologies.

**PSO3:** Inculcate understanding of responsibility in team work while contributing in the development of prototype, product or application as part of student's projects.

| Program Outcomes (PO) Mapping with WA & WK (As per National Board of Accreditation (NBA)) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Knowledge and Attitude Profile (WK) | | | | | | | | | |
| **PO** | **Domain** | **WA** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | |
| **PO1** | Engineering Knowledge | **WA1** | X | X | X | X | | | | | | **Analysis of problems & synthesis of solutions** |
| **PO2** | Problem Analysis | **WA2** | X | X | X | | | | | | | |
| **PO3** | Design/development of solutions | **WA3** | | | | | X | | | | | |
| **PO4** | Investigation | **WA4** | | | | | | | | X | | |
| **PO5** | Tool Usage | **WA5** | | X | | | | X | | | | |
| **PO6** | The Engineer and the World | **WA6** | X | | | | X | | X | | | **Responsibilities** |
| **PO7** | Ethics | **WA7** | | | | | | | | | X | |
| **PO8** | Individual and Collaborative Team work | **WA8** | | | | | | | | | X | **Required In work place** |
| **PO9** | Communication | **WA9** | | | | | | | | | | |
| **PO10** | Project Management and Finance | **WA10** | | | | | | | | | | |
| **PO11** | Lifelong learning | **WA11** | | | | | | | | X | | |

# Program – B. Tech. (Artificial Intelligence and Data Science)

**(Autonomous Curriculum Structure for students admitted from AY 2025-26 at FY)**

## A. Definition of Credit:

| | |
|---|---|
| 1 Hr. Lecture (L) per week | 1 credit |
| 1 Hr. Tutorial (T) per week | 1 credit |
| 2 Hours Practical (Lab) per week | 1 credit |

## B. Range of Credits:

Student will become eligible to get Under Graduate (UG) **B. Tech. degree in Artificial Intelligence and Data Science** after earning **160 credits.** A student will be eligible to get Under **Graduate degree with Honors** or additional **Minor Engineering**, if he/she completes an additional **20 credits from SEM-V to SEM-VIII.**

## C. Credit for B. Tech. Degree in Artificial Intelligence and Data Science

| Sr. No. | Year | Semester | Credits |
|---|---|---|---|
| 1 | First Year | I | 22 |
| 2 | | II | 22 |
| 3 | Second Year | III | 21 |
| 4 | | IV | 23 |
| 5 | Third Year | V | 18 |
| 6 | | VI | 18 |
| 7 | Final Year | VII | 18 |
| 8 | | VII | 18 |
| **Total Credits** | | | **160** |

## D. Structure of B. Tech. program

| Abbreviation | Course Type | Credit |
|---|---|---|
| BSC | Basic Science Courses | 18 |
| ESC | Engineering Science Courses | 12 |
| PCC | Program Core Courses | 44 |
| PEC | Program Elective Courses | 20 |
| CEP | Community Engagement Project | 02 |
| VEC | Value Education Courses | 04 |
| IAP | Internship and Project | 14 |
| MDM | Multidisciplinary Minor | 14 |
| OEC | Open Elective Courses | 08 |
| VSE | Vocational and Skill Enhancement Course | 06 |
| REM | Research Methodology | 04 |
| EMC | Entrepreneurship and Management Courses | 04 |
| AEC | Ability Enhancement Course | 04 |
| CCC | Co-curricular Courses | 04 |
| IKS | Indian Knowledge System | 02 |
| | **Total** | **160** |

## E. Minor Structure: B. Tech (Artificial Intelligence and Machine Learning)

| Sr. No. | Courses Name | SEM | Credits |
|---|---|---|---|
| 1 | Deep Learning | V | 3 |
| 2 | Deep Learning Laboratory | | 2 |
| 3 | Design and Analysis of Algorithm | VI | 3 |
| 4 | Design and Analysis of Algorithm Laboratory | | 2 |
| 5 | Generative AI | VII | 3 |
| 6 | Generative AI Laboratory | | 2 |
| 7 | Artificial Neural Networks | VIII | 3 |
| 8 | Artificial Neural Networks Laboratory | | 2 |
| | | **Total** | **20** |

**F. Honors Courses: Cyber Security**

| Sr. No. | Courses Name | SEM | Credits |
|---|---|---|---|
| 1 | Network Security and Cryptography | V | 5 |
| 2 | Ethical Hacking | VI | 5 |
| 3 | Secure Software Development | VII | 5 |
| 4 | Cyber risk management and Compliance | VIII | 5 |
| | | **Total** | **20** |

**Honors Courses: Internet of Things**

| Sr. No. | Courses Name | SEM | Credits |
|---|---|---|---|
| 1 | Introduction to Internet of Things | V | 5 |
| 2 | Embedded IoT | VI | 5 |
| 3 | Cloud Integrated IoT Systems | VII | 5 |
| 4 | Security in Industrial IoT | VIII | 5 |
| | | **Total** | **20** |

**Honors Courses: Generative AI**

| Sr. No. | Courses Name | SEM | Credits |
|---|---|---|---|
| 1 | Generative Ai Introduction and Applications | V | 5 |
| 2 | Prompt Engineering basics | VI | 5 |
| 3 | Explainable AI | VII | 5 |
| 4 | Natural Language Processing | VIII | 5 |
| | | **Total** | **20** |

## Credit Distribution of Various Courses across Eight Semesters:

| SEM | Total Marks | No. of Credits for Course Category | | | | | | | | | | | | | | | Total Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BSC | ESC | PCC | PEC | MDM | OEC | VSE | AEC | EMC | IKS | VAC | REM | CEP | IAP | CCC | |
| I | 700 | 9 | 6 | 4 | | | | 1 | 2 | | | | | | | | 22 |
| II | 700 | 9 | 6 | 3 | | | | 1 | | | 2 | | | | | 1 | 22 |
| III | 700 | | | 9 | | 2 | 4 | | | 2 | | 2 | | 2 | | | 21 |
| IV | 700 | | | 8 | | 2 | 2 | 2 | 2 | 2 | | 2 | | | 2 | 1 | 23 |
| V | 700 | | | 4 | 8 | 4 | 2 | | | | | | | | | | 18 |
| VI | 700 | | | 4 | 4 | 2 | | 2 | | | | | | | 4 | 2 | 18 |
| VII | 700 | | | 6 | 2 | 2 | | | | | | | 4 | | 4 | | 18 |
| VIII | 700 | | | 6 | 6 | 2 | | | | | | | | | 4 | | 18 |
| **Total** | **5600** | **18** | **12** | **44** | **20** | **14** | **8** | **6** | **4** | **4** | **2** | **4** | **4** | **2** | **14** | **4** | **160** |

**Department Autonomous Co-ordinator**
**DYPCOEI**

**Head of Department**
**Artificial Intelligence and Data Science**
**DYPCOEI**

**Dean Academics**
**DYPCOEI**

**Director**
**DYPCOEI**

# 2.0 Course Structure – Artificial Intelligence and Data Science

## 2.1 Course Structure – S.Y. B.Tech. (Artificial Intelligence and Data Science)

| Artificial Intelligence and Data Science - Second Year (Semester –III) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level - 5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC201T | Discrete Mathematics and Statistics | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPCC202T | Data Structures | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ADPCC203T | Artificial Intelligence | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ILMDM201T | Multidisciplinary Minor-I | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ADPCC204P | Data Structures using Artificial Intelligence Laboratory | -- | -- | 4 | 2 | -- | -- | 25 | 50 | 25 | 100 |
| 6 | ADVEC205W | Social Well-Being | 1 | 1 | -- | 2 | -- | -- | 25 | -- | -- | 25 |
| 7 | ADCEP206O | Community Engagement - Field Project | -- | -- | 4 | 2 | -- | -- | 25 | -- | 50 | 75 |
| 8 | ILOEC201O | Open Elective Courses I | 2 | -- | -- | 2 | -- | -- | 25 | -- | 25 | 50 |
| 9 | ILOEC202W | Open Elective Courses II | 2 | -- | -- | 2 | -- | -- | 25 | -- | -- | 25 |
| 10 | ADEMC207W | Entrepreneurship and Startup Ecosystem | 1 | 1 | -- | 2 | -- | -- | 25 | -- | -- | 25 |
| **Total** | | | **15** | **02** | **08** | **21** | **200*** | **200#** | **150$** | **50$** | **100$** | **700** |

| MDM-I (ILMDM201T) | |
|---|---|
| ILMDM201T-1 | Smart cities and intelligent infrastructure |
| ILMDM201T-2 | Fundamentals of autonomy and intelligent behaviour |
| ILMDM201T-3 | Introduction to smart and precision agriculture |
| ILMDM201T-4 | Fundamentals of electric vehicles and comparison with ICE vehicles |
| ILMDM201T-5 | Fundamentals of additive manufacturing |
| ILMDM201T-6 | Fundamentals of healthcare systems and digital health |
| ILMDM201T-7 | Microcontrollers and Industrial Applications |

| Open Elective -I (ILOEC201O) | | Open Elective -II (ILOEC202W) | |
|---|---|---|---|
| ILOEC201O-1 | Engineering Economics | ILOEC202W-1 | MOOC- I |
| ILOEC201O-2 | AI in Finance Management | ILOEC202W-2 | Foreign Language- I |
| ILOEC201O-3 | Digital Finance | ILOEC202W-3 | UHV |

| | | | |
|---|---|---|---|
| ILOEC201O-4 | Financial Literacy | ILOEC202W-4 | Sustainable Development and Employability Skills |

| Artificial Intelligence and Data Science - Second Year (Semester –IV) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level - 5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC208T | Operating Systems | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPCC209T | Data Structures and Algorithms | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ADPCC210T | Database Management Systems | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ILMDM202T | Multidisciplinary Minor-II | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ADPCC211P | Laboratory for Data Structures Algorithms and Data Management | -- | -- | 4 | 2 | -- | -- | 25 | 50 | -- | 75 |
| 6 | ADVSE212P | DevOps in Machine Learning Laboratory | -- | -- | 4 | 2 | -- | | -- | 50 | -- | 50 |
| 7 | ADIAP213W | Internship | -- | -- | 4 | 2 | -- | -- | 25 | -- | -- | 25 |
| 8 | ADVEC214W | Sustainable Development | 2 | -- | -- | 2 | -- | -- | 25 | -- | -- | 25 |
| 9 | ILOEC203O | Open Elective Courses III | 2 | -- | -- | 2 | -- | -- | 25 | -- | 25 | 50 |
| 10 | ADAEC215W | Reasoning and Aptitude Development | 1 | 1 | -- | 2 | -- | -- | 25 | -- | -- | 25 |
| 11 | ADEMC216O | Technology Commercialization & Startup Development | 1 | 1 | -- | 2 | -- | -- | -- | -- | 25 | 25 |
| 12 | ADCCC217W | Co-Curriculum Course-II | -- | -- | 2 | 1 | -- | -- | 25 | -- | -- | 25 |
| **Total** | | | **14** | **02** | **14** | **23** | **200*** | **200#** | **150$** | **100$** | **50$** | **700** |

| MDM-II (ILMDM202T) | |
|---|---|
| ILMDM202T-1 | Sustainable energy and environment |
| ILMDM202T-2 | Perception, sensing, and sensor fusion |
| ILMDM202T-3 | Robotics and automation in farming operations |
| ILMDM202T-4 | Electric powertrain architecture and motor technologies |
| ILMDM202T-5 | 3D printing processes: FDM, SLA, SLS, DMLS, Binder Jetting, etc. |
| ILMDM202T-6 | AI techniques (ML, DL, NLP, CV) in diagnostics and prognosis |
| ILMDM202T-7 | Introduction to Embedded Processors |

| Open Elective -III (ILOEC203O) | |
|---|---|
| ILOEC203O-1 | Digital Marketing |

| | |
|---|---|
| ILOEC203O-1 | Critical Thinking and Problem Solving |
| ILOEC203O-3 | Ethics in Artificial Intelligence |

| **Co-Curriculum Course II (ADCCC217W)** |
|---|
| • Technical Events/Quiz/Paper Contest/Project Contest / Model Making etc. |
| • MOOC/ NPTEL/ SWAYAM/ Coursera etc. related to Professional Development and Social Activity |
| • Competitions/ Events Conducted by Professional Societies (ISTE, IEI, CSI, IEEE, IETE, SAE, ISRO-IIRS, SWE, ISHRAE, ASM, ISNT etc.) |
| • Attending Full time Conference/ Seminars/ Exhibitions/ Workshop/ STTP Conducted at IITs/ NITs/ Reputed Institutes/ Universities |
| • Attending Full time Conference/ Seminars/ Exhibitions/ Workshop/ STTP Conducted at DYPCOEI |
| • Paper Presentation in National/ International Conference of High Repute |
| • Poster Presentation in National/ International Conference of High Repute |
| • Paper Publication in National/ International Journal of High Repute |
| • Industrial Training/ Internship (at least for 04 Weeks) |
| • Participation in Institute Level Student Clubs |
| • Elected Student Representative of Student Council (University Representative, General Secretary, Cultural, Sports, NSS Secretary, Ladies Representative, Academic Toppers, Invitee Members) |
| • Office Bearer of Professional Society Chapter (ISTE, IEI, CSI, IEEE, IETE, SAE, ISRO-IIRS, SWE, ISHRAE, ASM, ISNT etc.) |
| • Office Bearer of Institute Level Student Club |
| • Office Bearer of Departmental Student Association |
| • Office Bearer of ECell, Digital Content Lab etc. |
| • Student Ambassador for Mayura AICTE IDEA Lab/ NIDHI iTBI etc. |
| • Editorial Board Member of Annual Magazine |
| • Editorial Board Member of E-Newsletter |
| • Member of Governance Committee/ Statutory Committee |

## 2.2 Course Structure – T.Y. B.Tech. (Artificial Intelligence and Data Science)

| Artificial Intelligence and Data Science - Third Year (Semester –V) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level - 5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC301T | Data Science for Engineers | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPEC302T | Program Elective Courses I | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ADPEC303T | Program Elective Courses II | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ILMDM303T | Multidisciplinary Minor-III | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ILMDM304T | Multidisciplinary Minor-IV | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 6 | ADPCC304P | Data Science for Engineers Laboratory | -- | -- | 4 | 2 | -- | - | 50 | 50 | -- | 100 |
| 7 | ADPEC305P | Program Elective Course - I & II Laboratory | -- | -- | 4 | 2 | -- | -- | -- | 50 | -- | 50 |
| 8 | ILOEC304W | Open Elective Courses IV | -- | -- | 4 | 2 | -- | -- | 50 | -- | -- | 50 |
| **Total** | | | **13** | **--** | **12** | **18** | **250*** | **250#** | **100$** | **100$** | -- | **700** |

| Program Elective-I (ADPEC202T) | | Program Elective-II (ADPEC303T) | |
|---|---|---|---|
| ADPEC302T(A) | Data Warehousing and Data Mining | ADPEC303T(A) | Applied Statistics for Data Science |
| ADPEC302T(B) | Python for Data Science | ADPEC303T(B) | Web Development - Frontend |
| ADPEC302T(C) | Networks and Security | ADPEC303T(C) | AI In Cybersecurity |
| ADPEC302T(D) | Machine Learning | ADPEC303T(D) | Artificial Neural Networks |

| MDM-III (ILMDM303T) | | MDM-IV (ILMDM304T) | |
|---|---|---|---|
| ILMDM303T-1 | Role of IoT, AI, and data analytics in sustainability | ILMDM304T-1 | Waste, water, and resource management |
| ILMDM303T-2 | AI and machine learning for autonomous decision-making | ILMDM304T-2 | Robotics and embedded systems |
| ILMDM303T-3 | IoT and wireless sensor networks for field monitoring | ILMDM304T-3 | AI and data analytics for crop prediction and decision-making |
| ILMDM303T-4 | Battery systems and energy storage technologies | ILMDM304T-4 | Power electronics and charging systems |
| ILMDM303T-5 | CAD modelling and slicing software | ILMDM304T-5 | Materials for 3D printing: plastics, metals, ceramics, composites, bio-materials |
| ILMDM303T-6 | Medical imaging analysis using AI | ILMDM304T-6 | Predictive analytics for patient monitoring and disease outbreaks |
| ILMDM303T-7 | Embedded Machine Learning | ILMDM304T-7 | Introduction to Microcontroller and IoT |

| Open Elective -IV (ILOEC304W) | |
|---|---|
| ILOEC304W-1 | Intellectual Property Rights |
| ILOEC304W-2 | MOOC- 2 |
| ILOEC304W-3 | Foreign Language-2 |

| Artificial Intelligence and Data Science - Third Year (Semester –VI) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level - 5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC306T | Big Data Analytics | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPEC307T | Program Elective Courses III | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ILMDM305T | Multidisciplinary Minor-V | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ADVSE308T | R programming for AI | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ADPCC309P | Big Data Analytics Laboratory | -- | -- | 2 | 1 | -- | -- | 25 | 50 | -- | 75 |
| 6 | ADPEC310O | Program Elective Courses III Laboratory | -- | -- | 2 | 1 | -- | -- | 50 | -- | 50 | 100 |
| 7 | ADIAP311O | Mini Project and Seminar | -- | -- | 8 | 4 | -- | -- | 50 | -- | 50 | 100 |
| 8 | ADCCC312W | Co-Curriculum Course-III | -- | -- | 4 | 2 | -- | -- | 25 | -- | -- | 25 |
| **Total** | | | **10** | **--** | **16** | **18** | **200*** | **200#** | **150$** | **50$** | **100$** | **700** |

| Program Elective-III (ADPEC310T) | |
|---|---|
| ADPEC310T(A) | Data Preparation and Analysis |
| ADPEC310T(B) | Web Development - Backend |
| ADPEC310T(C) | Data Privacy and Ethics |
| ADPEC310T(D) | Natural Language Processing (NLP) |

| MDM-V (ILMDM305T) | |
|---|---|
| ILMDM305T-1 | Life-cycle thinking and system optimization |
| ILMDM305T-2 | Real-time systems and control |
| ILMDM305T-3 | Drone technologies in agriculture (e.g., for spraying, mapping) |
| ILMDM305T-4 | Vehicle dynamics and control systems |
| ILMDM305T-5 | Design for Additive Manufacturing (DfAM) |
| ILMDM305T-6 | AI in drug discovery and personalized medicine |
| ILMDM305T-7 | Embedded System and RTOS |

| Co-Curriculum Course III (ADCCC312W) |
|---|
| • Prototype Developed and Tested |
| • Awards for Products Developed |
| • Innovative Technologies Developed and Used by Industries |
| • Got Funding from Government/ Industry for Innovative Ideas |
| • Patent-Filed/ Published/ Approved/ Licensed |
| • Social Innovations |
| • Implementation of Mind Mapping |
| • Idea to Market: Implementation of Startup |
| • Development of Business Model through Technology |

## 2.3 Course Structure – B.Tech. (Artificial Intelligence and Data Science)

| Artificial Intelligence and Data Science – B. Tech (Semester –VII) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level -5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC401T | Responsible AI Practices with AWS | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPCC402T | Computational Intelligence | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ADPEC403T | Program Elective Courses IV | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ILMDM406T | Multidisciplinary Minor-VI | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ADREM404T | Research Methodology | 4 | -- | -- | 4 | 50 | 50 | -- | -- | -- | 100 |
| 6 | ADPCC405P | Responsible AI Practices Laboratory | -- | -- | 2 | 1 | -- | -- | 25 | 25 | -- | 50 |
| 7 | ADPCC406P | Computational Intelligence Laboratory | -- | -- | 2 | 1 | -- | -- | 25 | 25 | -- | 50 |
| 8 | ADIAP407O | Project Stage I | -- | -- | 8 | 4 | -- | -- | 50 | -- | 50 | 100 |
| **Total** | | | **12** | **--** | **12** | **18** | **250*** | **250#** | **100$** | **50$** | **50$** | **700** |

| Program Elective-IV (ADPEC403T) | |
|---|---|
| ADPEC403T(A) | Data Classification and Evaluation |
| ADPEC403T(B) | API Development and Testing |
| ADPEC403T(C) | Blockchain Technology |
| ADPEC403T(D) | Deep Learning |

| MDM-VI (ILMDM406T) | |
|---|---|
| ILMDM406T-1 | Sustainable mobility and urban planning |
| ILMDM406T-2 | Human-machine interaction and ethics |
| ILMDM406T-3 | Automated irrigation and fertigation systems |
| ILMDM406T-4 | Environmental impact and sustainability of EVs |
| ILMDM406T-5 | Post-processing techniques and quality control |
| ILMDM406T-6 | Clinical decision support systems (CDSS) |
| ILMDM406T-7 | System Engineering |

| Artificial Intelligence and Data Science – B. Tech (Semester –VIII) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level -5 | | | | | | | | | | | | |
| Sr. No. | Code | Course Title | Hours/week | | | Credits | Examination scheme | | | | | |
| | | | L | T | P | | CCE | SEE | TW | PR | OR | Total |
| 1 | ADPCC408T | Quantum Artificial Intelligence | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 2 | ADPCC409T | Data Modelling and Visualization | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 3 | ADPEC410T | Program Elective Courses V | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 4 | ADPEC411T | Program Elective Courses VI | 3 | -- | -- | 3 | 50 | 50 | -- | -- | -- | 100 |
| 5 | ILMDM407T | Multidisciplinary Minor-VII | 2 | -- | -- | 2 | 50 | 50 | -- | -- | -- | 100 |
| 6 | ADPCC412P | Quantum Artificial Intelligence Laboratory | -- | -- | 2 | 1 | -- | -- | 25 | 25 | -- | 50 |
| 7 | ADPCC413P | Data Modelling and Visualization Laboratory | -- | -- | 2 | 1 | -- | -- | 25 | 25 | -- | 50 |
| 8 | ADIAP414O | Project Stage II | -- | -- | 8 | 4 | -- | -- | 50 | -- | 50 | 100 |
| **Total** | | | **12** | **--** | **12** | **18** | **250*** | **250#** | **100$** | **50$** | **50$** | **700** |

| Program Elective-V (ADPEC411T) | | Program Elective-VI (ADPEC412T) | |
|---|---|---|---|
| ADPEC411T(A) | Information Retrieval and Virtual Reality | ADPEC412T(A) | Predictive Modelling and Analytics |
| ADPEC411T(B) | DevOps and Agile Software Development | ADPEC412T(B) | AWS: Cloud Computing Services |
| ADPEC411T(C) | Secure AI Systems | ADPEC412T(C) | AI for Cyber Threat Intelligence |
| ADPEC411T(D) | Reinforcement Learning | ADPEC412T(D) | Emotional Intelligence |

| MDM-VII (ILMDM407T) | |
|---|---|
| ILMDM407T-1 | Policy frameworks and Sustainable Development Goals |
| ILMDM407T-2 | Applications in transportation, healthcare, defence, and industry 4.0 |
| ILMDM407T-3 | Sustainable practices and environmental impact |
| ILMDM407T-4 | EV infrastructure, standards, and smart grid integration |
| ILMDM407T-5 | Applications in medical, automotive, aerospace, and prototyping |
| ILMDM407T-6 | Ethical, regulatory, and legal issues in AI for healthcare |
| ILMDM407T-7 | Capstone Project using Microcontrollers Lab (CPML) |

| | |
|---|---|
| # | **Semester End Examination (SEE)** based on subjective questions. |
| $ | **LAB /Practical or Hands-on/ Activity based Evaluation.** |
| * | **Comprehensive Continuous Evaluation (CCE)** based on Unit Tests, Home Assignment/Comprehensive, Presentation/Group Discussion/Laboratory Work/Course Project/Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination. |
| @ | **For MOOCs:** Assignments marks will be converted on the scale of 50 marks. |
| % | **For MOOCs:** Score of examination conducted by the respective authority of MOOC or Score of SEE Conducted by Institute will be converted on the scale of 50 marks. |