JOY UNIVERSITY
semper paratus

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**School of Computational Intelligence**
**Department of Computing & Information Systems**

**B.Tech. CSE (Artificial Intelligence and Machine Learning)**
**(In collaboration with Intel and NEC)**

## Programme Educational Objectives

**PEO1:** Graduates will possess an Industry-Academic Synergy of AI and ML principles enhanced by practical experience gained through collaboration with Intel and NEC.

**PEO2:** Graduates will stay at the forefront of technological advancements by continually engaging with the latest industry trends, tools and practices.

**PEO3:** Graduates will excel in applying their knowledge to solve real-world problems, leveraging the industry-driven curriculum and hands-on training provided by Intel and NEC.

## Program Outcomes (POs)

The Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

## Programme Specific Objectives (PSO's)

1. Graduates will demonstrate proficiency in applying AI and ML theories and tools to real-world problems, leveraging collaborations
2. Graduates will acquire essential entrepreneurial skills including business planning, market analysis, and product development with guidance from Intel and NEC experts.
3. Students will be proficient in designing, developing and testing AI and ML prototypes, translating theoretical knowledge into practical applications.

## Semester I

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| 1. | 24BTIN111 | Fundamentals of Computing | 3 | 0 | 0 | 3 | 3 |
| 2. | 24BTIN112 | Fundamentals of C Programming with Intel Libraries | 3 | 0 | 0 | 3 | 3 |
| 3. | 24BTIN113 | Mathematics I | 3 | 1 | 0 | 4 | 4 |
| 4. | 24BTIN114 | Physics I | 3 | 1 | 0 | 4 | 4 |
| 5. | 24AEEN811 | Effective Communication | 3 | 0 | 0 | 3 | 3 |
| 6. | 24BTIN911 | Performing Arts/Sports (Non-Graded) | 3 | 0 | 0 | 3 | 0 |
| 7. | 24BTIN111 | Fundamentals of Computing | 0 | 0 | 2 | 2 | 1 |
| 8. | 24BTIN112 | Fundamentals of C Programming with Intel Libraries | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **18** | **2** | **4** | **24** | **19** |

## Semester II

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs /Wk | Credits |
|---|---|---|---|---|---|---|---|
| 1. | 24BTIN121 | Python Programming and RASPBERRY PI Fundamentals | 3 | 0 | 0 | 3 | 3 |
| 2. | 24BTIN122 | Probability, Statistics and Stochastic Processes | 3 | 0 | 0 | 3 | 3 |
| 3. | 24BTIN123 | Mathematics II | 3 | 1 | 0 | 4 | 4 |
| 4. | 24BTIN124 | Physics II | 3 | 0 | 0 | 3 | 3 |
| 5. | 24BTIN125 | Discrete Structures for Computer Science | 3 | 0 | 0 | 3 | 3 |
| 6. | 24EVST921 | Environmental Science | 2 | 0 | 0 | 2 | 2 |
| 7. | 24BTIN221 | Python Programming and RASPBERRY PI Fundamentals Lab | 0 | 0 | 2 | 2 | 1 |
| 8. | 24BTIN222 | Physics II Lab | 0 | 0 | 2 | 2 | 1 |
| 9. | 24BTIN223 | Extended Reality and its Applications (from TANSAM) | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **17** | **1** | **6** | **24** | **21** |

## Semester III

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| **1.** | 24BTIN131 | Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| **2.** | 24BTIN132 | Signals and Systems | 3 | 0 | 0 | 3 | 3 |
| **3.** | 24BTIN133 | Digital Design | 3 | 0 | 0 | 3 | 3 |
| **4.** | 24BTIN134 | Data Structures and Algorithms | 3 | 0 | 0 | 3 | 3 |
| **5.** | 24BTIN135 | Object-Oriented Programming | 3 | 0 | 0 | 3 | 3 |
| **6.** | 24BTIN136 | Professional Ethics | 2 | 0 | 0 | 2 | 2 |
| **7.** | 24BTIN931 | Indian Constitution | 1 | 0 | 0 | 1 | 0 |
| **8.** | 24BTIN231 | Digital Design Lab | 0 | 0 | 2 | 2 | 1 |
| **9.** | 24BTIN232 | Data Structures and Algorithms Lab | 0 | 0 | 2 | 2 | 1 |
| **10.** | 24BTIN233 | Object-Oriented Programming Lab | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **18** | **0** | **6** | **24** | **20** |

## Semester IV

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs /Wk | Credits |
|---|---|---|---|---|---|---|---|
| 1. | 24BTIN141 | Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 2. | 24BTIN142 | Database Management Systems | 3 | 0 | 0 | 3 | 3 |
| 3. | 24BTIN143 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 | 3 |
| 4. | 24BTIN144 | Computer Organization | 3 | 0 | 0 | 3 | 3 |
| 5. | 24BTIN145 | Operating Systems | 3 | 0 | 0 | 3 | 3 |
| 6. | 24BTIN146 | Engineering Economics and Foreign Trade | 3 | 0 | 0 | 3 | 3 |
| 7. | 24BTIN241 | Machine Learning Lab | 0 | 0 | 2 | 2 | 1 |
| 8. | 24BTIN242 | Database Management Systems Lab | 0 | 0 | 2 | 2 | 1 |
| 9. | 24BTIN243 | Design and Analysis of Algorithms Lab | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **18** | **0** | **6** | **24** | **21** |

**Semester V**

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| **1.** | 24BTIN151 | Deep Learning | 3 | 0 | 0 | 3 | 3 |
| **2.** | 24BTIN151 | Computer Networks | 3 | 0 | 0 | 3 | 3 |
| **3.** | 24BTIN151 | Computer Architecture | 3 | 0 | 0 | 3 | 3 |
| **4.** | 24BTIN151 | Software Engineering | 3 | 0 | 0 | 3 | 3 |
| **5** | 24BTIN151 | Programming with Java | 3 | 0 | 0 | 3 | 3 |
| **6** | 24BTIN151 | Theory of Computation | 3 | 1 | 0 | 4 | 4 |
| **7** | 24BTIN851 | Principles of Management | 3 | 0 | 0 | 3 | 3 |
| **8** | 24BTIN251 | Deep Learning Lab | 0 | 0 | 2 | 2 | 1 |
| **9** | 24BTIN252 | Computer Networks Lab | 0 | 0 | 2 | 2 | 1 |
| **10** | 24BTIN253 | Programming with Java Lab | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **21** | **1** | **6** | **28** | **25** |

## Semester VI

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| **1.** | 24BTIN161 | Integrated advanced AI and IoT | 3 | 0 | 0 | 3 | 3 |
| **2.** | 24BTIN162 | Compiler Design | 3 | 0 | 0 | 3 | 3 |
| **3.** | 24BTIN163 | Cryptography and Network Security | 3 | 0 | 0 | 3 | 3 |
| **4.** | 24BTIN164 | Realistic AI | 3 | 0 | 0 | 3 | 3 |
| **5.** | 24BTIN165 | Data Visualization | 3 | 0 | 0 | 3 | 3 |
| **6.** | 24BTIN06* | Programme Specific Elective I | 3 | 0 | 0 | 3 | 3 |
| **7.** | 24BTIN36* | Generic Elective I | 3 | 0 | 0 | 3 | 3 |
| **8.** | 24BTIN261 | Integrated advanced AI and IoT Lab | 0 | 0 | 2 | 2 | 1 |
| **9.** | 24BTIN262 | Realistic AI Lab | 0 | 0 | 2 | 2 | 1 |
| **10** | 24BTIN263 | Programme Specific Elective I Lab | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **21** | **0** | **6** | **27** | **24** |

## Programme Specific Electives I

| Sl. No. | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|
| 24BTIN061 | Applied Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| 24BTIN062 | Applied Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 24BTIN063 | Scalable Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 24BTIN064 | Neuromorphic Computing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN065 | Computer Vision | 3 | 0 | 0 | 3 | 3 |
| 24BTIN066 | Internet of things | 3 | 0 | 0 | 3 | 3 |

## Generic Electives I

| Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|
| 24BTIN361 | Continual Learning | 3 | 0 | 0 | 3 | 3 |
| 24BTIN362 | Social Network Analysis | 3 | 0 | 0 | 3 | 3 |
| 24BTIN363 | Full Stack Development-DevOps | 3 | 0 | 0 | 3 | 3 |
| 24BTIN364 | Foundations of Quantum Information Processing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN365 | Block Chain and its Applications | 3 | 0 | 0 | 3 | 3 |
| 24BTIN366 | Digital Image Processing | 3 | 0 | 0 | 3 | 3 |

**Semester VII**

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| **1.** | 24BTIN171 | High Performance Computing | 3 | 0 | 0 | 3 | 3 |
| **2.** | 24BTIN172 | Ethics, Policy, Laws and Standards in AI | 3 | 0 | 0 | 3 | 3 |
| **3.** | 24BTIN173 | Web Technology | 3 | 0 | 0 | 3 | 3 |
| **4.** | 24BTIN174 | Pattern Recognition | 3 | 0 | 0 | 3 | 3 |
| **5.** | 24BTIN471 | Industrial Internship | 0 | 0 | 0 | 0 | 2 |
| **6.** | 24BTIN37* | Generic Elective II | 3 | 0 | 0 | 3 | 3 |
| **7.** | 24BTIN175 | Systems Engineering | 3 | 0 | 0 | 3 | 3 |
| **8.** | 24BTIN271 | High Performance Computing Lab | 0 | 0 | 2 | 2 | 1 |
| **9.** | 24BTIN272 | Web Technology Lab | 0 | 0 | 2 | 2 | 1 |
| | | **TOTAL** | **18** | **0** | **4** | **22** | **22** |

**Generic Electives II**

| Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|
| 24BTIN371 | Nature Inspired Computing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN372 | Fuzzy sets, Logics and Systems | 3 | 0 | 0 | 3 | 3 |
| 24BTIN373 | Full Stack Development-UI/UX | 3 | 0 | 0 | 3 | 3 |
| 24BTIN374 | Cognitive Computing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN375 | Six Sigma | 3 | 0 | 0 | 3 | 3 |
| 24BTIN376 | Computational and Systems Biology | 3 | 0 | 0 | 3 | 3 |

**Semester VIII**

| Sl. No. | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Credits |
|---|---|---|---|---|---|---|---|
| **1.** | 24BTIN581 | Capstone Project | 0 | 0 | 0 | 0 | 15 |
| **2.** | 24BTIN08* | Programme Specific Elective II | 3 | 0 | 0 | 3 | 3 |
| **3.** | 24BTIN08* | Programme Specific Elective III | 3 | 0 | 0 | 3 | 3 |
| | | **TOTAL** | **6** | **0** | **0** | **6** | **21** |

## Programme Specific Electives II

| Course Code | Course Title | L | T | P | Contact Hrs/ Wk | Credits |
|---|---|---|---|---|---|---|
| 24BTIN081 | Game Theory for Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 24BTIN082 | Semantic Web Technology | 3 | 0 | 0 | 3 | 3 |
| 24BTIN083 | Resource Constrained Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| 24BTIN084 | Web data Mining | 3 | 0 | 0 | 3 | 3 |
| 24BTIN085 | GPU Computing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN086 | Approximation Algorithms | 3 | 0 | 0 | 3 | 3 |

## Programme Specific Electives III

| Course Code | Course Title | L | T | P | Contact Hrs/ Wk | Credits |
|---|---|---|---|---|---|---|
| 24BTIN087 | Evolutionary Computation | 3 | 0 | 0 | 3 | 3 |
| 24BTIN088 | Advanced Python- Object Oriented Programming | 3 | 0 | 0 | 3 | 3 |
| 24BTIN089 | Generative AI | 3 | 0 | 0 | 3 | 3 |
| 24BTIN080 | Digital Marketing | 3 | 0 | 0 | 3 | 3 |
| 24BTIN08a | Augmented Intelligence | 3 | 0 | 0 | 3 | 3 |

## Credit Summary

| Semesters | Credits |
|---|---|
| Semester-I | 19 |
| Semester-II | 20 |
| Semester-III | 20 |
| Semester-IV | 21 |
| Semester-V | 25 |
| Semester-VI | 24 |
| Semester-VII | 22 |
| Semester-VIII | 21 |
| **Total** | **172** |