JOY UNIVERSITY

Established vide Tamil Nadu State Pvt. Universities Act 2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

Outcome Based Curriculum Framework with

CBCS

for

BACHELOR OF TECHNOLOGY

(B. Tech Mechanical Engineering with Specialization in Artificial Intelligence and Machine Learning)

Students admitted from 2025 -26 onwards

JOY UNIVERSITY
semper paratus

VISION

♣ To create and nurture a multidisciplinary global university with highest academics, research and ethical standards in a creative and innovative environment.

MISSION

♣ To be a premier University of choice for all stakeholders and contribute for academic demographic dividend. To inculcate quality, integrity, team work, compassion, ethics in new generation students for catering to various needs of society.

QUALITY OBJECTIVES

- To disseminate knowledge with skills through teaching, training, seminars, workshops, conferences and symposia in Engineering and Technology, Art and Design, Management and Commerce, Allied Health Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences, Law and Agricultural Sciences to enable students to meet the current needs and trends of industries, business and society.
- To provide technical and scientific solutions to real time problems posed by industries, business and society in all Schools of Joy University.
- To inculcate quality, integrity, team work, compassion and ethics in new generation students for catering to various needs of society.
- To promote the spirit of entrepreneurship in the young generation to help and create more career opportunities in the society by incubating a nurturing technology product idea backed by Technology Business Incubation.
- To identify and nurture leadership and innovate skills in students to become future leaders to enrich society.
- To develop collaborations and partnerships with International global and reputed Universities, research establishments, Government and NGO's, industries and businesses. To support both faculties and students for international exposure.

SCHOOL OF ENGINEERING AND TECHNOLOGY

VISION

To emerge as a premier center for engineering excellence and innovation, cultivating globally competent professionals committed to driving sustainable development and transformative technological advancements for the betterment of society.

MISSION

- Deliver excellence in engineering education by integrating theoretical knowledge, practical skills, and innovation to equip students for addressing global challenges.
- Foster an environment that encourages curiosity, innovation, and cross-disciplinary research to tackle evolving technological and societal challenges.
- Engage with industry, academic institutions, and communities to enrich education, foster entrepreneurship, and support holistic professional development.
- Cultivate ethical responsibility, leadership qualities, and a dedication to sustainability and continuous learning in all graduates.
- Advance societal progress through the application of inclusive, sustainable, and efficient engineering solutions.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: Graduates will attain strong fundamentals in mechanical engineering and artificial intelligence to analyze, design, and develop intelligent systems and automation solutions for real-world engineering problems.

PEO2: Graduates will pursue successful careers in core industries, research, or higher education by integrating mechanical engineering knowledge with AI/ML tools, algorithms, and modern engineering practices.

PEO3: Graduates will demonstrate ethical responsibility, environmental awareness, and a commitment to address societal challenges by developing intelligent and sustainable engineering solutions.

PEO4: Graduates will engage in continuous learning, interdisciplinary collaboration, and innovation through research, entrepreneurship, and skill development in emerging technologies.

GRADUATE ATTRIBUTES

The Graduate Attributes of B. Tech (Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning) are:

GA1: Apply appropriate knowledge in Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning to identify, formulate, analyze, and solve complex engineering problems in order to reach substantive conclusions.

GA2: Self-learn and engage in use of advanced computing tools.

GA3: Develop sustainable computing solutions in broader economic, societal and environmental contexts.

GA4: Think critically, creatively and analytically as a mechanical scientist, whilst being able to work effectively, independently and collaboratively as part of a team in research, technology development and entrepreneurial ventures.

GA5: Apply evolving ethics and privacy laws across various domains and territories.

GA6: Effectively communicate engineering concepts and ideas to peers in written or oral forms.

GA7: Be motivated to engage in independent and life-long learning in the broadest context of evolving technological challenges.

PROGRAMME OUTCOMES

On completion of the **B. Tech (Mechanical Engineering with specialization in Artificial Intelligence and Machine Learning) Programme,** students should be able to:

PO1: Engineering knowledge: Apply knowledge of mathematics, science, mechanical engineering fundamentals and artificial intelligence to solve complex engineering problems.

PO2: Problem analysis: Identify, formulate, and analyze mechanical and AI/ML-based problems using appropriate tools and principles to arrive at substantiated conclusions.

PO3: Design/development of solutions: Design intelligent systems, components or processes to meet desired needs with consideration for public health, safety, cultural, societal and environmental concerns.

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

PO5: Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and AI/ML tools for predictive analysis, simulation and real-time control with an understanding of limitations.

PO6: The engineer and society: Apply contextual knowledge to assess societal, health, safety, legal and cultural issues relevant to professional engineering practice and AI-driven technologies.

PO7: Environment and sustainability: Understand the impact of engineering and AI/ML solutions in societal and environmental contexts and demonstrate knowledge of sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics, responsibilities and norms of engineering and AI/ML practice.

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

PO10: Communication: Communicate effectively on engineering and AI/ML activities with the engineering community and with society at large, including the ability to write reports, make presentations, and give/receive instructions.

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

PO12: Life-long learning: Recognize the need for and have the ability to engage in independent and life-long learning in the context of technological advancements, especially in AI/ML and mechanical domains.

PROGRAM SPECIFIC OUTCOMES

PSO1: Apply principles of mechanical engineering integrated with artificial intelligence and machine learning techniques to design, analyze and optimize intelligent products, systems and processes.

PSO2: Utilize data analytics, machine learning algorithms and computational tools to model, simulate, and control mechanical systems for smart manufacturing, robotics and automation applications.

PSO3: Demonstrate the ability to innovate and apply interdisciplinary knowledge in solving real-world problems through the convergence of mechanical engineering, AI/ML and emerging technologies.

Summary of Credits

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	23	21	24	24	22	22	13	14	163
Contact Hrs./Week	27	24	29	28	26	23	9	6	172

SEMESTER WISE CREDIT STRUCTURE

Sl. No.	Category of Courses	1st Year		2nd Year		3rd Year		4th Year		Total
		Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Sem VII	Sem VIII	
1.	Departmental Core	4	3	13	14	9	7			50
2.	Discipline Specific Electives (DSE)				6	6	6	6	6	30
3.	Open Electives					3	3	3		9
4.	Applied Sciences	8	8	4						20
5.	Seminar/ Summer Internships/ Independent Study and Seminar						3			3
6.	Project							4	8	12
7.	Skill Enhancement Course	8	8	7	4	4	3			34
8.	Ability Enhancement Courses (AECC)	3								3
9.	Value-Added Course		2							2
Total		**23**	**21**	**24**	**24**	**22**	**22**	**13**	**14**	**163**

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School of Engineering and Technology

B. Tech (Mechanical Engineering with specialization in AI & ML)

Semester – I

(Total Credits: 23)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME111	**Applied Sciences** Mathematics – I	3	1	0	4	4
2.	25BTME112	**Applied Sciences** Physics – I	3	1	0	4	4
3.	25AEEN911	**Ability Enhancement Compulsory Course (AECC)** Effective Communication	3	0	0	3	3
4.	25BTME113	**Skill Enhancement Course** Fundamentals of Computing	3	0	0	3	3
5.	25BTME114	**Skill Enhancement Course** Introduction to Programming	3	0	0	3	3
6.	25BTME115	**Core Course** Engineering Drawing	2	0	2	4	3
7.	25BTME211	**Skill Enhancement Course** Fundamentals of Computing Lab	0	0	2	2	1
8.	25BTME212	**Skill Enhancement Course** Introduction to Programming Lab	0	0	2	2	1
9.	25BTME213	**Core Course** Basic Workshop Practical	0	0	2	2	1
		Total	**17**	**2**	**10**	**27**	**23**

Semester – II

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME121	**Applied Science** Mathematics – II	3	1	0	4	4
2.	25BTME122	**Applied Science** Physics II	3	0	0	3	3
3.	25EVST921	**Value Added Course** Environmental Science	2	0	0	2	2
4.	25BTME123	**Core Course** Engineering Mechanics	3	0	0	3	3
5	25BTME124	**Skill Enhancement Course** Fundamentals of Electrical & Electronics Engineering	3	0	0	3	3
6.	25BTME125	**Skill Enhancement Course** Python Programming	3	0	0	3	3
7.	25BTME221	**Applied Science** Physics Laboratory	0	0	2	2	1
8.	25BTME222	**Skill Enhancement Course** Basic Electrical and Electronics Engineering Laboratory	**0**	0	**2**	2	**1**
9.	25BTME223	**Skill Enhancement Course** Python Programming Lab	0	0	2	2	1
		TOTAL	**17**	**1**	**6**	**24**	**21**

Semester – III

(Total Credits: 24)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME131	**Applied Science** Mathematics – III	3	1	0	4	4
2.	25BTME132	**Skill Enhancement Course** Data Structures and Algorithms	3	0	0	3	3
3.	25BTME133	**Skill Enhancement Course** Artificial Intelligence	3	0	0	3	3
4.	25BTME134	**Core Course** Thermodynamics	3	0	0	3	3
5.	25BTME135	**Core Course** Strength of Materials	3	0	0	3	3
6.	25BTME136	**Core Course** Fluid Mechanics and Machinery	3	0	0	3	3
7.	25BTME231	**Skill Enhancement Course** Data Structure and Algorithm Laboratory	0	0	2	2	1
8.	25BTME232	**Core Course** Strength of Materials Laboratory	0	0	4	4	2
9.	25BTME233	**Core Course** Fluid Mechanics and Machinery Laboratory	0	0	4	4	2
		Total	**18**	**1**	**10**	**29**	**24**

Semester – IV

(Total Credits: 24)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME141	**Core Course** Theory of Machines	3	1	0	4	4
2.	25BTME142	**Skill Enhancement Course** Machine Learning	3	0	0	3	3
3.	25BTME143	**Core Course** Manufacturing Technology	3	0	0	3	3
4.	25BTME144	**Core Course** Design of Machine Elements	3	1	0	4	4
5.	25BTME341 25BTME342 25BTME343	**Discipline Specific Elective (DSE) I** Robotics and Automation IoT Systems design Soft computing Techniques	3	0	0	3	3
6.	25BTME344 25BTME345 25BTME346	**Discipline Specific Elective (DSE) II** Advanced Materials and Composites Nano materials and Nanotechnology Pollution and Control	3	0	0	3	3
7.	25BTME241	**Skill Enhancement Course** Machine Learning Laboratory	0	0	2	2	1
8.	25BTME242	**Core Course** Manufacturing Technology Laboratory	0	0	4	4	2
9.	25BTME243	**Core Course** Computer Aided Machine Drawing Laboratory	0	0	2	2	1
		Total	**18**	**02**	**08**	**28**	**24**

Semester – V

(Total Credits: 26)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME151	**Core Course** Thermal Engineering	3	0	0	3	3
2.	25BTME152	**Core Course** Computer Integrated Manufacturing	3	0	0	3	3
3.	25BTME153	**Skill Enhancement Course** Deep Learning	3	0	0	3	3
4.	25BTME351 25BTME352 25BTME353	**Discipline Specific Elective (DSE) III** Machine Diagnostics and condition monitoring Digital signal and Image processing Vibration Engineering	3	0	0	3	3
5.	25BTME354 25BTME355 25BTME356	**Discipline Specific Elective (DSE) IV** Finite Element Analysis Renewable Energy Sources Smart Materials	3	0	0	3	3
6.	25BTME051 25BTME052 25BTME053	**Open Elective I** Electric and Hybrid Vehicles Digital and Smart Manufacturing Resource Management Techniques	3	0	0	3	3
7.	25BTME251	**Core Course** Thermal Engineering Laboratory	0	0	4	4	2
8.	25BTME252	**Core Course** Computer Integrated Manufacturing Laboratory	0	0	2	2	1
9.	25BTME253	**Core Course** Deep Learning Laboratory	0	0	2	2	1
		Total	**18**	**0**	**8**	**26**	**22**

Semester – VI

(Total Credits: 25)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME161	**Core Course** Heat and Mass transfer	3	0	0	3	3
2.	25BTME162	**Skill Enhancement Courses** Data Science	3	0	0	3	3
3.	25BTME361 25BTME362 25BTME363	**Discipline Specific Elective V** Micro and Nano manufacturing Gas Dynamics Computational Fluid mechanics	3	0	0	3	3
4.	25BTME364 25BTME365 25BTME366	**Discipline Specific Elective VI** Artificial Neural Network Mechatronics System in Engineering Smart Sensors and Actuators	3	0	0	3	3
5.	25BTME061 25BTME062 25BTME063	**Open Elective II** Energy Conservation and Management Reliability Engineering Project Management	3	0	0	3	3
6.	25BTME261	**Core Course** Heat and Mass transfer Laboratory	0	0	4	4	2
7.	25BTME262	**Core Course** Simulation and Analysis Laboratory	0	0	4	4	2
8.	25BTME461	**Internships/ Field Visits** Industrial/ Research Internship	0	0	0	0	3
		Total	**15**	**0**	**08**	**23**	**22**

Semester – VII

(Total Credits: 22)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME371 25BTME372 25BTME373	**Discipline Specific Elective VII** Material Characterization Techniques Engineering Failure Analysis Automobile Engineering	3	0	0	3	3
2.	25BTME374 25BTME375 25BTME376	**Discipline Specific Elective VIII** Power Plant Engineering Tribology Control Systems in Mechanical Engineering	3	0	0	3	3
3.	25BTME071 25BTME072 25BTME073	**Open Elective III** Non-Destructive Testing Artificial Intelligence in Robotics & Automation Human Computer Interaction	3	0	0	3	3
4.	25BTME571	**Project** Project- Phase I	0	0	0	0	4
		Total	**09**	**0**	**0**	**09**	**13**

Semester – VIII

(Total Credits: 17)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME381 25BTME382 25BTME383	**Discipline Specific Elective IX** Artificial Intelligence Applications in Mechanical Engineering Energy conservation and Management Non-Destructive testing	3	0	0	3	3
2.	25BTME384 25BTME385 25BTME386	**Discipline Specific Elective X** Industrial Engineering Professional Ethics Operations Research	3	0	0	3	3
3.	25BTME581	**Project** Project- Phase II	0	0	0	0	8
		Total	**6**	**0**	**0**	**6**	**14**