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 Robotics and Automation)

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, 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 apply their knowledge of robotics and automation, mechanical engineering, mathematics, and science to design, analyze, and solve engineering problems in both the industry and research domains.

PEO2: Graduates will excel as team leaders or members in multidisciplinary teams, taking on diverse roles in engineering projects, management, and operations.

PEO3: Graduates will engage in lifelong learning through advanced studies, professional development, and adapting to emerging technologies and methodologies.

PEO4: Graduates will demonstrate ethical responsibility, respect for diversity, and sustainable practices in their engineering work, contributing to societal welfare.

PEO5: Graduates will exhibit strong communication skills, both verbal and written, essential for working in engineering environments and interacting with peers, clients, and the public.

GRADUATE ATTRIBUTES

The Graduate Attributes of B. Tech (Mechanical Engineering with specialization in Robotics and Automation) are:

GA1: Apply appropriate knowledge in Robotics and Automation, Mechanical Engineering 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 Robotics and Automation) Programme,** students should be able to:

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

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduates will be able to design, analyze, and develop mechanical systems and robotic solutions across domains such as manufacturing, automation, thermal systems, and industrial applications, by effectively applying engineering principles, technological tools, and interdisciplinary knowledge.

PSO2: Graduates will demonstrate the ability to integrate concepts from control system and automation, thermodynamics, fluid mechanics, materials science, and computer programming to solve complex, real-world engineering problems, fostering innovation through automation and intelligent systems.

PSO3: Graduates will be proficient in the use of modern software, simulation tools, and communication techniques, and will engage in lifelong learning, research, and continuous improvement, enabling them to adapt to evolving technologies and communicate technical ideas effectively across various platforms and stakeholders.

Summary of Credits

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	23	21	24	24	23	22	13	14	164
Contact Hrs./Week	27	24	29	28	28	23	9	6	174

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	5	3	16	14	14	7			59
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	4	4					24
8.	Ability Enhancement Courses (AECC)	3					3			6
9.	Value-Added Course		2							2
Total		**23**	**21**	**24**	**24**	**23**	**22**	**13**	**14**	**164**

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School of Engineering and Technology

B. Tech (Mechanical Engineering with Specialization of Robotics and Automation)

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**	**8**	**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.	25BTME222	**Applied Science** Physics Laboratory	0	0	2	2	1
8.	25BTME223	**Skill Enhancement Course** Basic Electrical and Electronics Engineering Laboratory	**0**	0	**2**	2	**1**
9.	25BTME224	**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	**Core Course** Materials Engineering and Metallurgy	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** Fundamentals of Machine Learning	3	0	0	3	3
3.	25BTME143	**Core Course** Manufacturing Technology	3	0	0	3	3
4.	25BTME144	**Core Course** Robotics and Automation	3	1	0	4	4
5.	25BTME341 25BTME342 25BTME343	**Discipline Specific Elective (DSE) I** Robot Mechanics and Control Tool Design Design of Machine Elements	3	0	0	3	3
6.	25BTME344 25BTME345 25BTME346	**Discipline Specific Elective (DSE) II** Advanced Materials and Composites Nanomaterials and Nanotechnology Pollution and Control	3	0	0	3	3
7.	25BTME241	**Skill Enhancement Course** Fundamentals of Machine Learning Laboratory	0	0	2	2	1
8.	25BTME242	**Core Course** Manufacturing Technology Laboratory	0	0	4	4	2
9.	25BTME243	**Core Course** Robotics Engineering Software Laboratory	0	0	2	2	1
		Total	**18**	**02**	**08**	**28**	**24**

Semester – V

(Total Credits: 23)

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	**Core Course** Metrology and Measurements	3	0	0	3	3
4.	25BTME351 25BTME352 25BTME353	**Discipline Specific Elective (DSE) III** Advanced Automation Systems Refrigeration and Air Conditioning 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 Digital Image Processing	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** Metrology and Measurements Laboratory	0	0	4	4	2
		Total	**18**	**0**	**10**	**28**	**23**

Semester – VI

(Total Credits: 22)

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	**Ability Enhancement Courses** Sensors and Control Systems	3	0	0	3	3
3.	25BTME361 25BTME362 25BTME363	**Discipline Specific Elective V** Artificial Intelligence in Robotics & Automation Micro and Nano manufacturing Gas Dynamics	3	0	0	3	3
4.	25BTME364 25BTME365 25BTME366	**Discipline Specific Elective VI** Mechatronics in Robotics and Automation Additive Manufacturing Principles of Management and Engineering Economics	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** Automation and Control Systems 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: 13)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME371 25BTME372 25BTME373	**Discipline Specific Elective VII** Soft Robotics Material Characterization Techniques Engineering Failure Analysis	3	0	0	3	3
2.	25BTME374 25BTME375 25BTME376	**Discipline Specific Elective VIII** Microsystems Design and Applications Power Plant Engineering Tribology	3	0	0	3	3
3.	25BTME071 25BTME072 25BTME073	**Open Elective III** Non-Destructive Testing Computational Fluid mechanics 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: 14)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTME381 25BTME382 25BTME383	**Discipline Specific Elective IX** Autonomous Robot Vehicles Battery Management Systems (BMS) Non-Destructive testing	3	0	0	3	3
2.	25BTME384 25BTME385 25BTME386	**Discipline Specific Elective X** Robot Applications and Programming 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**