BIRLA INSTITUTE OF TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) CURRICULUM

(NEW COURSE STRUCTURE – To be effective from Academic Session 2022-23)

M.TECH IN PRODUCTION AND INDUSTRIAL ENGINEERING

PRODUCTION AND INDUSTRIAL ENGINEERING DEPARTMENT

INSTITUTE VISION

- To become a Globally Recognised Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research, and technological service to the National needs.

INSTITUTE MISSION

- To educate students at Undergraduate, Postgraduate, Doctoral, and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education, and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

DEPARTMENT VISION:

- To become a Centre of Repute striving continuously towards providing Quality Education, Research, and Innovation in the field of Production and Industrial Engineering

DEPARTMENT MISSION

- To provide quality education at both undergraduate and post graduate levels
- To provide opportunities and facilities for research and innovation in Production and Industrial Engineering
- To produce industry-ready graduates to meet the demands of manufacturing industries, knowledge-based software firms, supply chain and logistic firms, and R&D organizations
- To integrate skills on state-of-the-art manufacturing technology with industrial engineering and operations management
- To impart latest knowledge in the domain area to students by continuous up-gradation of curricula and faculty

Programme Educational Objectives (PEOs) – Production And Industrial Engineering

- ✓ **PEO 1:** Graduates will develop into independent researchers and academicians in the broad area of production and industrial engineering
- ✓ **PEO 2:** Graduates will demonstrate a high level of competency and problem-solving aptitude to find innovative solutions for theoretical and practical problems
- ✓ **PEO 3:** Developing a practice of continuously updating with latest knowledge and information in their relevant field of specialization
- ✓ **PEO 4:** Graduates should engage with engineering profession and understand the importance of ethics, teamwork, and professionalism

Graduate Attributes (GAs)

GA1: Scholarship of Knowledge

Acquire in-depth knowledge of specific discipline or professional area, including wider and global perspective, with an ability to discriminate, evaluate, analyse, and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge.

GA2: Critical Thinking

Analyse complex engineering problems critically, apply independent judgement for synthesising information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.

GA3: Problem Solving

Think laterally and originally, conceptualise, and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.

GA4: Research Skill

Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyse and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.

GA5: Usage of modern tools

Create, select, learn, 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.

GA6: Collaborative and Multidisciplinary work

Possess knowledge and understanding of group dynamics, recognise opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.

GA7: Project Management and Finance

Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.

GA8: Communication

Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

GA9: Life-long Learning

Recognise the need for and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

GA10: Ethical Practices and Social Responsibility

Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.

GA11: Independent and Reflective Learning

Observe and examine critically the outcomes of one's actions and make corrective measures subsequently and learn from mistakes without depending on external feedback.

PROGRAM OUTCOMES (POs) for M.TECH. (AUTOMATED MANUFACTURING SYSTEMS)

Compulsory PO

- ✓ **PO1:** An ability to independently carry out research /investigation and development work to solve practical problems.
- ✓ **PO2**: Ability to write and present a substantial technical report/document.
- ✓ **PO3:** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Optional PO (Program Specific)

- ✓ **PO4:** Application of engineering and technological knowledge to solve a wide range of Production and Industrial problems.
- ✓ **PO5:** Developing expertise in manufacturing related subjects both at the theory and practical level.
- ✓ **PO6:** Developing the ability and expertise in the students to apply latest data analytics tools and techniques for computing and engineering practice.

PROGRAMME COURSE STRUCTURE

BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI
REVISED COURSE STRUCTURE - Effective from academic session 2022-23
Based on CBCS & OBE Model
Recommended scheme of study for M.Tech in PRODUCTION & INDUSTRIAL ENGINEERING

SEMESTER / Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery & Credits *L-Lecture; T-Tutorial; P-Practical*			Total Credits *C- Credits*
					L (*Periods/ week*)	T (*Periods/ week*)	P (*Periods/ week*)	C
	THEORIES							
FIRST / Monsoon	**Fifth**	**Programme Core (PC)**	**PE 503**	**Planning & Control of Production System**	**3**	**0**	**0**	**3**
			PE 511	**Computer Integrated Manufacturing**	**3**	**0**	**0**	**3**
			PE 522	**Optimization Techniques**	**3**	**0**	**0**	**3**
			PE 523	**Manufacturing Strategies**	**3**	**0**	**0**	**3**
			PE 524	**Advanced Manufacturing Technologies**	**3**	**0**	**0**	**3**
	LABORATORIES							
	Fifth	**Humanities and Social Science (HSS)**	**MT 132**	**Communication Skills - I**	**0**	**0**	**3**	**1.5**
		(PC)	**PE 502**	**Computer Aided Manufacturing Lab**	**0**	**0**	**4**	**2**
			PE 525	**Advanced Manufacturing Technologies Lab**	**0**	**0**	**4**	**2**
		TOTAL						**20.5**
THEORIES								
SECOND/ Spring	**Fifth**	**Electives of Production & Operations Management Specialization (Any 5 courses)**	**PE 504**	**Modelling and Simulation**	**3**	**0**	**0**	**3**
			PE 508	**Operations & Supply Chain Management**	**3**	**0**	**0**	**3**
			PE 518	**Data Analytics**	**3**	**0**	**0**	**3**
			PE 521	**Quality Engineering and Robust Design**	**3**	**0**	**0**	**3**
			PE 526	**Advanced Topics in Operations Research**	**3**	**0**	**0**	**3**
			PE 527	**Soft Computing in Manufacturing**	**3**	**0**	**0**	**3**
		Electives of Production Technology Specialization (Any 5 courses)	**PE 510**	**Robotics & Robot Applications**	**3**	**0**	**0**	**3**
			PE 521	**Quality Engineering and Robust Design**	**3**	**0**	**0**	**3**
			PE 527	**Soft Computing in Manufacturing**	**3**	**0**	**0**	**3**
			PE 528	**Manufacturing Automation**	**3**	**0**	**0**	**3**
			PE 529	**Advanced Machining Technologies**	**3**	**0**	**0**	**3**
			PE 530	**Materials for Engineering Applications**	**3**	**0**	**0**	**3**
			PE 531	**Analysis of Material Deformation Processes**	**3**	**0**	**0**	**3**
			PE 532	**Additive Manufacturing**	**3**	**0**	**0**	**3**
			ME 506	**Applied Tribology**	**3**	**0**	**0**	**3**

SECOND/ Spring	**LABORATORIES**							
	Fifth	**(HSS)**	**MT 133**	**Communication Skills - II**	**0**	**0**	**3**	**1.5**
		(PC)	**PE 505**	**Manufacturing Simulation Lab**	**0**	**0**	**4**	**2**
			PE 517	**Computer Aided Design & Drafting Lab**	**0**	**0**	**4**	**2**
		TOTAL						**20.5**

THIRD / Monsoon	**Sixth**	**THEORIES**						
		(PC)	**PE 600**	**Thesis (Part I)**				**8**
		Open Elective (OE)		**Open Elective - I / MOOC - I**	**3**	**0**	**0**	**3**
				Open Elective – II / MOOC - II	**3**	**0**	**0**	**3**
		TOTAL						**14**
FOURTH/ Spring	**Sixth**	**(PC)**	**PE650**	**Thesis (Part II)**				**16**
		TOTAL						**16**
GRAND TOTAL FOR M. TECH PROGRAMME (41 + 30)								**71**

OPEN ELECTIVE COURSES

LEVEL / SESSION	Code no.	Name of the OE courses	Prerequisites courses with code	L	T	P	C
SISTH / (MO)	**PE 601**	**Automated Manufacturing**	**None**	**3**	**0**	**0**	**3**
SIXTH / (MO)	**PE 602**	**Smart Manufacturing**	**None**	**3**	**0**	**0**	**3**

*** OPEN ELECTIVES TO BE OPTED ONLY BY OTHER DEPARTMENT STUDENTS**