## ANNEXURE I

| SL. NO | MODULE NAME | MODULE CONTENT | MODULE LEARNING OUTCOME | DURATION (HRS) |
|---|---|---|---|---|
| 1 | Introduction to DELMIA and the Basics of Industrial Robotics | - Overview of DELMIA, robot types, robot programming basics, and applications. - Advantages of DELMIA robotics. | - Understand the fundamentals of robotic simulation using DELMIA. - Identify different types of robots and their applications in industry. | 10 |
| 2 | Assembly Robot Programmer | - Course introduction, work cell preparation, robot import/positioning, resource import/positioning, tool setup, robot jogging, defining simulation states, creating tags/tag groups, robot task definition, and task simulation. | - Master the process of setting up and simulating assembly robot tasks in DELMIA. | 10 |
| 3 | Fabrication Robot Programmer for Arc Welding Operation | - Course introduction, to positioner overview, work cell preparation, application profile creation, arc | - Gain expertise in programming and simulating robotic arc welding operations using DELMIA. | 10 |

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| | | welding profile creation, robot trajectory definition, arc tag manipulation, and arc welding task creation/validation. | | |
| 4 | Surface Robot Programmer | - Course introduction, work cell preparation, defining surface trajectories, defining painting processes, simulating and analyzing paint deposition. | - Develop skills in programming and simulating robotic surface treatment processes (e.g., painting) in DELMIA. | 15 |

## ANNEXURE II

| Overall Course Learning Outcome and Use Cases | | | |
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| **LEARNING OUTCOME** | **ASSESSMENT CRITERIA** | **PERFORMANCE CRITERIA** | **USE CASES** |
| Apply robotic simulation principles using DELMIA. | - Quizzes and assignments on DELMIA fundamentals. - Hands-on exercises in DELMIA. - Midterm and final exams. | - Demonstrates understanding of DELMIA interface and basic functionalities. - Accurately creates and modifies robot models and workcells. - Simulates robot motions and analyzes results. | - Creating basic robot simulations. - Setting up workcells and defining robot tasks. - Simulating simple assembly and welding operations. |
| Design, simulate, and validate robotic work cells and operations. | - Project-based assignments involving complex workcell design. - Peer reviews and presentations. - Industry-standard certifications (if applicable). | - Designs efficient and ergonomic workcells. - Simulates complex robotic operations with accurate timing and motion. - Validates robot programs through virtual simulation. | - Designing automated assembly lines. - Optimizing robot workcell layouts. - Validating robot programs before deployment. |
| Program, optimize, and analyze robotic | - Programming exercises using DELMIA's | - Writes efficient robot programs for various tasks. - Optimizes robot motion paths to | - Programming robots for complex assembly operations. - Optimizing robot motion for maximum productivity. - |

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| movements for industrial automation. | scripting capabilities. - Optimization challenges and simulations. - Analysis of robot performance metrics. | minimize cycle time and energy consumption. - Analyzes robot performance data to identify bottlenecks and improvement areas. | Analyzing robot performance to reduce cycle time and improve quality. |
| Integrate real-time control systems and workflows for enhanced manufacturing productivity and accuracy. | - Simulations involving integration with real-time systems. - Case studies on real-world implementations. - Industry collaborations and internships. | - Integrates robot simulations with real-world control systems. - Optimizes workflows to reduce cycle times and improve quality. - Implements advanced features like predictive maintenance and remote monitoring. | - Integrating robots with PLC systems for synchronized operations. - Implementing advanced robot programming techniques for flexible manufacturing. - Integrating digital twin technologies for real-time monitoring and optimization. |
| Apply learnings to industry-standard robotic applications through hands-on projects. | - Industry-based projects and case studies. - Hands-on experience with industrial robots (if available). - Internship or industry placements. | - Applies DELMIA skills to solve real-world manufacturing problems. - Works collaboratively with industry experts to implement robotic solutions. - Adapts to new technologies and industry trends. | - Designing and implementing robotic solutions for automotive, aerospace, and electronics industries. - Collaborating with industry partners to develop innovative robotic applications. - Staying updated with the latest advancements in robotic technology. |

**List of Final Projects**

| s. no. | PROJECTS | DESCRIPTION |
|---|---|---|
| 1 | Virtual Factory Layout Design | Use DELMIA to simulate, design, and optimize factory layouts to improve workflows and reduce inefficiencies. |
| 2 | Robot Programming and Simulation | Develop and test robotic programming in a virtual environment before deploying it on the production floor. |
| 3 | Assembly Line Balancing | Analyze and optimize assembly line operations to minimize idle time and maximize throughput. |
| 4 | Ergonomics Simulation | Perform human-centric simulations to ensure workplace safety and ergonomic compliance in manufacturing setups. |
| 5 | Digital Twin Development | Create digital twins of physical systems to monitor, analyze, and improve production processes in real time. |
| 6 | Manufacturing Process Planning | Plan and validate manufacturing processes virtually, reducing the need for physical prototypes. |
| 7 | Material Flow Optimization | Simulate and optimize material handling systems, including conveyors, automated guided vehicles (AGVs), and storage systems. |
| 8 | Production System Debugging | Identify bottlenecks or inefficiencies in virtual simulations to troubleshoot production lines. |
| 9 | Cost Reduction Analysis | Analyze production workflows digitally to identify cost-saving opportunities. |
| 10 | Workforce Training | Train employees in a simulated environment to handle equipment and workflows effectively. |
| 11 | Multi-Scenario Process Validation | Test multiple production scenarios digitally to identify the most efficient processes under varying conditions. |
| 12 | Product Lifecycle Management Integration | Integrate DELMIA simulations with PLM systems to improve collaboration and ensure data continuity. |
| 13 | Energy Efficiency Simulation | Model energy consumption in manufacturing processes and identify ways to improve energy efficiency. |
| 14 | Compliance Testing and Reporting | Simulate and document compliance with industry standards and regulatory requirements in manufacturing processes. |
| 15 | Flexible Manufacturing Systems Design | Simulate and optimize systems that can adapt to changing production requirements or product types. |
| 16 | 3D Resource Modeling | Create 3D models of machines, tools, and resources to ensure proper allocation and usage in production lines. |
| 17 | Predictive Maintenance | Simulate equipment performance to predict potential failures and schedule preventive maintenance. |
| 18 | Lean Manufacturing Implementation | Apply lean principles in a virtual environment to identify waste and streamline production processes. |
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| 19 | Supplier Collaboration | Share simulation models with suppliers for better collaboration and alignment on manufacturing processes. |
| 20 | Custom Production Simulations | Develop custom simulations for unique manufacturing challenges, such as high-mix low-volume (HMLV) production setups. |

## ANNEXURE III

| ASSESSMENT RUBRICS | | | | | |
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| **ASSESSMENT CRITERIA** | **DESCRIBE THE CRITERIA OF THE BELOW CATEGORY PERFORMANCE** | **FAIR** | **GOOD** | **EXCELLENT** | **TOTAL MARKS** |
| Demonstrates ability to perform job-specific tasks effectively using DELMIA software. | - Basic understanding and application of DELMIA functionalities for robotic simulation. | Meets minimum requirements. | Demonstrates some proficiency. | Consistent and skilled application. | 20 |
| Applies theoretical concepts to practical scenarios with accuracy and relevance. | - Analyzes and solves basic robotic simulation problems in DELMIA. | Solves problems with some guidance. | Solves problems independently with appropriate solutions. | Demonstrates critical thinking and innovation in problem-solving. | 15 |
| Completes assigned projects or use cases demonstrating innovation. | - Completes projects following basic guidelines and functionalities. | Meets project requirements. | Meets requirements with some evidence of creative solutions. | Develops innovative solutions and demonstrates a high level of project management skills. | 25 |
| Communication and Reporting | - Clear and concise communication of project findings and reports. | Basic communication skills. | Effective communication with clear explanations. | Excellent communication skills with well-organized and detailed reports. | 10 |