ANNEXURE I

MODULE-WISE COURSE CONTENT AND OUTCOME				
CREO DESIGN BASIC				
SL.NO	**MODULE NAME**	**MODULE CONTENT**	**MODULE LEARNING OUTCOME**	**DURATION (HRS)**
1	Creo Parametric Concepts	- Solid Modelling Concept - Feature -Based Approach - Parametric effectiveness - Associativity Benefits - How Model Centric concepts reflect	1. Develop robust, adaptable, and feature-based 3D models in Creo. 2. Efficiently manage design changes using parametric and associative tools. 3. Leverage model-centric methodologies to streamline the design-to-production workflow. 4. Contribute to modern, collaborative engineering practices with a strong foundation in Creo Parametric principles.	2
2	Creo Parametric Fundamentals	- About User Parameters - About Parameter Properties - Non associativity of User Parameters - Using the Parameters Dialog Box - To Display Material Parameters in the Parameters Dialog Box - Syntax for Including Parameters in Notes - To Create a Parameter - About the	1. Create, edit, and manage user parameters and properties for robust design control. 2. Incorporate material parameters, units, and restricted values into designs effectively. 3. Utilize relations to automate model updates and establish parametric dependencies. 4. Copy, delete, and designate parameters efficiently to streamline workflows. 5. Apply advanced parameter and	8

		Parameter Used in Relations - Creating Common Parameters - To Delete a Parameter - About Copying Parameter Definitions - To Copy Parameters between Two Models in Session - Using the Designate Dialog Box - Units in Parameters and Relations - Restricted Value Parameters - Basic Relations Information - Operators and Functions Used in Relations - Parameters Used in Relations - Creating and Editing Relations	relation techniques to develop adaptable and intelligent 3D models.	
3	Creo Parametric Productivity	-Group, copy, and mirror items -Create patterns -Measure and inspect models -Assemble with constraints -'Assemble with connections -'Explode assemblies -'Lay out drawings and create views -'Create drawing annotations -'Use layers -'Investigate parent/child	1. Efficiently create, inspect, and manage complex models and assemblies. 2. Use patterns, constraints, and connections to streamline design workflows. 3. Lay out and annotate professional technical drawings with precision. 4. Organize designs using layers and maintain parent/child relationships. 5. Capture design intent to build robust	8

		relationships -'Capture and manage design intent -'Resolve failures and seek help	and adaptable models. 6. Resolve modelling issues and leverage available resources for continuous improvement.	
4	Advanced Geometry Creation tool	-Learn advanced selection techniques - Create advanced datum features -Use advanced sketching techniques -Create advanced holes -Create advanced drafts and ribs - Create advanced shells -Create advanced rounds and chamfers -Use relations and parameters -Create advanced blends	1. Demonstrate proficiency in using advanced geometry creation tools to design complex and precise models. 2. Use advanced selection and sketching techniques to enhance efficiency and accuracy. 3. Create sophisticated features such as advanced datum references, holes, shells, ribs, drafts, rounds, and chamfers. 4. Leverage parameters and relations to build adaptable and automated models. 5. Design advanced blends for seamless and functional geometry transitions.	4
5	Sheetmetal	-Create, convert, and display the sheet metal model -Use methods of developed length calculation -Use primary and secondary wall features, as well as partial walls -Use bend relief -Use unbends and bend-back features -Apply sheet	1. Create and modify sheet metal models, incorporating primary and secondary walls, bends, and cuts. 2. Utilize advanced tools like flat patterns, bend relief, and forms to optimize designs for manufacturability. 3. Apply design rules and environment setup to ensure compliance with industry standards. 4. Generate accurate	6

		metal bend features -Use flat patterns -Create Sheetmetal cuts -Create forms -Use notch and punch features -Utilize the Sheetmetal environment setup, sheet metal design information tools, and Sheetmetal design rules -Detail Sheetmetal designs	manufacturing documentation with detailed annotations and developed lengths. 5. Solve complex sheet metal design challenges using Creo's specialized tools.	
6	Detailing	-Understand the drawing development process - Create new drawings using formats and drawing templates -Create different types of views in drawings -Create dimensions and notes -Control display options using layers -Apply dimensional and geometric tolerances in drawings -Add draft geometry and symbols to drawings -Use layers in drawings to control the display of views	1. Develop professional and detailed engineering drawings with accurate dimensions, notes, and annotations. 2. Create and manage views, layers, and tables to enhance clarity and functionality. 3. Apply GD&T and other tolerancing techniques to ensure drawings meet precision manufacturing requirements. 4. Configure the drawing environment and templates for consistency and efficiency. 5. Handle complex and large-scale drawings with confidence, ensuring quality and productivity.	6

		and detail items -Create drawing tables and a bill of materials -Create drawing formats -Configure the drawing environment -Manage large drawings		
7	Creo Model Based Definition	- Describe 3-D annotations and compare them to 2-D drawings -3D Annotation and Notes - Describe the steps in the MBD process - Describe the functionality on the Annotate tab - Identify the methods for accessing combined states -Create & Modify annotation elements -Publish for technical data packages	1. Create and manage 3D annotations and notes, replacing traditional 2D drawings. 2. Grasping and execute the MBD process to support digital product definitions. 3. Use the Annotate tab and combined states effectively to organize and present design information. 3. Modify annotation elements and manage views for clear communication. 4. Publish technical data packages for seamless collaboration across design, manufacturing, and quality assurance teams.	5
8	Design Exploration	- About Design Exploration - About the Design Exploration Folder - About Unsupported File Types and Modes - To Start a New Design Exploration	1. Navigate and utilize the Design Exploration environment in Creo to explore multiple design alternatives and make data-driven decisions. 2. Work with pre-modified models, checkpoints, and the checkpoint tree to	2

		Session - About the Design Exploration User Interface -About the Pre-modified Models - About the Entry Checkpoint - About the Checkpoint Tree - About Opening an Existing Design Exploration Session - To Open an Existing Design Exploration Session - About Saving a Design Exploration Session -To Save a Design Exploration Session - About Closing a Design Exploration Session - To Accept a Design Exploration Session - To Cancel a Design Exploration Session	track and manage design changes. 3. Open, save, accept, and cancel Design Exploration sessions effectively, ensuring that design modifications are well-documented and organized. 4. Optimize the design process by leveraging Creo's Design Exploration tools to explore and compare different configurations quickly.	
9	Creo Intelligent Fastener	- About Working with Creo Intelligent Fastener (IFX) - Using Creo Intelligent Fastener - Working with Screw Connections - Working with Dowel Pin	1. Efficiently use Creo Intelligent Fastener (IFX) to automate the process of placing and configuring fasteners in assembly designs. 2. Create and manage screw connections, dowel pins, and other fasteners in	1

		Fasteners - Working with Fasteners - Converting Fastener Library	assemblies with precision. 3. Customize and apply fastener properties, such as size, material, and type, in compliance with industry standards. 4. Convert and manage fastener libraries for streamlined design processes, ensuring fastener selection is accurate and consistent.	
10	Creo Welding Design	- Using Welding - Configuring Creo for Using Welding - Creating Materials, Processes, Preferences, and Parameters - Creating Welding Features - Changing Welding Features - Obtaining Welding Information - Exporting Welding Information - Detailing Welding Assemblies	1. Efficiently use Creo Welding Design tools to simulate and design welded assemblies. 2. Configure Creo to support various welding processes, materials, and parameters. 3. Create, modify, and manage welding features and configurations, including beads, joints, and symbols. 4. Obtain and export welding data for manufacturing and quality control purposes. 5. Create detailed welding drawings and annotations that clearly communicate welding requirements to fabrication teams.	1

11	Advance Framework	- Introduction - Using Creo Advanced Framework - Working with Elements - Working with Projects - Working with Profiles - Working with Joints, Cutouts, Planar Trims, and Replace Surface Joints - Working with Weld Groups - Additional Tools	1. Navigate and effectively use Creo Advanced Framework tools to create and manage complex structural designs. 2. Work with elements, profiles, joints, and weld groups, ensuring precision and efficiency in creating framework assemblies. 3. Create and manage projects and custom profiles to optimize workflow and ensure consistency in designs. 4. Use cutouts, planar trims, and replace surface joints to make necessary adjustments for optimal fit and assembly. 5. Apply advanced tools to design, analyse, and finalize framework designs, ensuring structural integrity and manufacturability.	2

ANNEXURE II

OVERALL COURSE LEARNING OUTCOME ASSESSMENT CRITERIA AND USE CASES			
LEARNING OUTCOME	**ASSESSMENT CRITERIA**	**PERFORMANCE CRITERIA**	**USE CASES**
1. Be able to create, modify, and document 3D models using parametric modelling techniques. 2. Have expertise in designing parts, assemblies, and tooling, with a deep understanding of surface and solid modelling. 3. Be proficient in creating detailed drawings, technical documentation, and implementing model-based definitions (MBD) for modern manufacturing workflows. 4. Master Creo's automation features (e.g., parameters, relations) to streamline design modifications and enhance productivity.	1. Evaluating hands-on design skills. 2. Ensuring proficiency in parametric modelling and feature-based design. 3. Testing the ability to use advanced features like Sheetmetal design, assembly management, drawing creation, MBD. 4. Incorporating tasks that assess workflow efficiency, error resolution, and the ability to apply design rules to achieve manufacturable and optimized designs.	1. Utilize Creo tools efficiently to create models, assemblies, and drawings. 2. Implement advanced design features (e.g., surfacing, sheet metal, welds). 3. Apply parametric design and ensure designs are flexible and adaptable. 4. Manage the documentation process, including technical drawings and MBD. 5. Explore and validate designs through simulation and performance analysis.	**Use Case 1:** Design of complex automotive parts, such as engine components, suspension systems, and body frames. Scenario: In an automotive company, engineers use Creo Parametric to design and simulate key vehicle components, such as engine parts (e.g., crankshafts, pistons), suspension systems, and car chassis. They use advanced geometry tools, parametric design, and simulation capabilities to ensure that parts are both structurally sound and optimized for performance. **Use Case 2:** Designing components for earth-moving machines, like bulldozers and excavators. Scenario: A heavy machinery manufacturer uses Creo for the design of parts such as hydraulic cylinders, tracks, and chassis. Engineers create detailed parts that require heavy-duty materials and high-strength features. They use Creo's assembly capabilities to simulate the interactions between the different components and ensure the assembly's functionality before physical

			prototyping.

LIST OF FINAL PROJECTS (5 PROJECTS THAT COMPREHENSIVELY COVER ALL THE LEARNING OUTCOME)	
SL.NO	**FINAL PROJECT**
1	Engine assembly
2	Machine Support frame
3	Disk Assembly
4	Conveyor
5	Valve assembly with MBD

ANNEXURE III

TABLE 3: COURSE ASSESSMENT RUBRICS (TOTAL MARKS: 70)				
ASSESSMENT CRITERIA	**DESCRIBE THE CRITERIA OF THE BELOW CATEGORY PERFORMANCE**			**TOTAL MARKS**
	FAIR	**GOOD**	**EXCELLENT**	
Practical Skills Proficiency	5	10	15	15
Technical Knowledge Application	10	20	25	25
Project Execution	5	10	15	15
Communication and Reporting	5	10	15	15

Category	**Assessment Criteria**	**Performance Levels**	**Weightage (Marks)**
Practical Skills Proficiency	1. Basic Drawing and Modelling 2. Parametric Design and Feature-Based Modelling 3. Advanced Design Techniques 4. Sheet Metal Design with advance 5.Advanced Assembly Techniques 6. Detailing Creation 7. Final Design Submission	Fair, Good, Excellent	15
Technical Knowledge Application	1. Design Fundamentals and Principles 2. Industry Standards 3. Troubleshooting 4. Design for Manufacturability 5. Drawing Creation	Fair, Good, Excellent	25
Project Execution	1. Project Planning and Initiation 2. Design Development and CAD Modelling 3. Review the design 4. Finalizing the Design and Documentation 5. Final Approval and Handoff	Fair, Good, Excellent	15
Communication and Reporting	1. Explaining the project with technical terms. 2. The project specifics are communicated clearly. 3. Focus on how the tools and methods used in the project addressed the design requirement	Fair, Good, Excellent	15

Performance Levels Description

Level	Description
Fair (50%-64%)	1. Can create simple models using basic features like extrude and revolve. 2. Struggles with creating and manipulating complex surfaces. 3. Can generate flat patterns for basic sheet metal parts. 4. Can create basic 2D views and annotations for simple parts or assemblies.
Good (65%-79%)	1. Effectively uses parametric principles to define and constrain models. 2. Can effectively modify assemblies based on design changes and new requirements. 3. Correctly applies standard dimensional and geometric tolerances in drawings. 4. Creates sheet metal parts with multiple features such as bends, flanges, and cutouts.
Excellent (80%-100%)	1. Can manage complex features and dependencies efficiently across large models. 2. Expert use of tolerances, fits, and custom annotations to meet design and manufacturing specifications. 3. Demonstrates advanced surface modelling techniques, such as boundary blends, sweeps, and curvature analysis. 4. Mastery in creating complex sheet metal parts using advanced operations, including reliefs, bends, and custom features.