Course Content for PDV Lab

Course Name	**:**	**Essentials for NX Designers**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

Students will learn how to create sketches to capture design intent, how to model a part efficiently, as well as assemble parts into product assemblies and produce drawings

Total No. of Lectures = 40

Lecture wise breakup		**Number of Lectures**
1.	**Introduction to CAD and NX User Interface:** templates, how to find commands, opening new files, setting your working directory, mouse functions, brief intro about Ribbons and tab etc. **Introduction to Sketcher:** Selecting working plane, Brief intro about Datum planes, curves like, profile tool, line tool, rectangle, circle tool Edit Curves subgroup tools like chamfer, fillet, trims, extend, move curves. More Curves subgroup tools like hexagon, studio Spline, ellipse, pattern curves, offset curve, mirror, also brief intro to constrains. Dimensional constrains like length, angle, diameter, radius and Geometric constrains like coincident, point on curve, tangent, horizontal, vertical, equal length, equal arc.	**11**
2.	**Part Modeling** **EDITING, EXTRUDING, AND REVOLVING SKETCHES:** Creating Base Features by Extruding, Extrude Dialog Box Options, Creating Solid Revolved Bodies, Hiding Entities, Showing Hidden Entities, Hiding All Entities Using a Single Tool, Rotating the View of a Model in 3D Space, Setting Display Modes. **WORKING WITH DATUM PLANES, COORDINATE SYSTEMS:** Additional Sketching and Reference Planes, Types of Datum Planes, Creating Three Fixed (Principle) Datum Planes, Creating Relative Datum Planes, Creating Datum Coordinate Systems, Creating Fixed and Relative Datum Axes. **Other Extrusion Options:** Specifying the Boolean Operation, Specifying Other Extrusion Termination Options, Projecting External Elements.	**7**

Course Content for PDV Lab

3.	**ADVANCED MODELING TOOl :** Creating Simple Holes, Creating Counter bore Holes, Creating Countersink Holes, Creating Holes by using the Hole Tool, Creating General Holes, Creating Drill Size Hole etc. Creating Grooves, Creating Slots, Creating Chamfers, Creating an Edge Blend. Instance Feature Tools like Creating Rectangular Arrays, Creating Circular Arrays, Using the Pattern Face, Mirror Feature Tool, Mirror Body Tool etc. Sweeping Sketches along the Guide Curves, Creating Swept Features, Creating Tubes or Cables and Editing the features.	**10**
4.	**ASSEMBLY MODELING:** The Assembly Environment, Types of Assembly Design Approaches, Creating Bottom-up Assemblies, Placing Components in the Assembly Environment, Applying Assembly Constraints to Components, Replacing, Moving, Repositioning, Mirroring, Modifying. The Top-down Assembly Design Approach, Creating Subassemblies, Editing Assembly Constraints, Checking Interference and Clearance, View Section Tool, Exploding Views.	**6**
5.	**GENERATING AND EDITING THE DRAWING VIEWS:** Drafting Environment, Template, Drawing Views like base view, Projected view, Detail view, Section View, auxiliary view, Broken View etc. **DIMENSIONING THE DRAWING VIEWS:** Adding Dimensions to the Drawing Views, Retrieving Dimensions from the Model, Exploded Views of an Assembly, Creating Parts List and Associative Balloons, Creating a Tabular Note (Title Block).	**6**

Course Outcome

- Student will be able to clear the basic concepts of computer aided design.
- Student will be able to do sketching, Part Modeling, Assembly and Drafting using NX CAD tool.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**NX CAD TRANSITIONAL**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

This course provides hands-on activities and projects that focus on history-free and parametric constraint-driven techniques to accelerate the design process used to create new parts, and to edit existing parts.

Total No. of Lectures = 40

	Lecture wise breakup	**Number of Lectures**
1.	**INTERMEDIATE NX DESIGN AND ASSEMBLIES;** Open and examine NX models, Create and edit parametric part models, Create and modify basic assembly structures, Modify imported model data, Create and modify basic drawings. Use the WAVE geometry linker- Create inter part references- Define remembered assembly constraints- Define a revision identifier- Understand component replacement methods- Manage assembly arrangements.	**8**
2.	**Advance Modeling Features.** Pattern sketch curves- Offset sketch curves- Create a basic free form shape- Create expressions with measurements- Copy/paste a feature- Create reference sets- Create draft- Use Synchronous Modelling- Create a variable blend- Create component patterns- Apply top down assembly modelling	**8**
3.	**Synchronous Modelling Fundamentals.** Modeling modes and switching between them, Working in history-free mode, Synchronous Modeling constraints (make tangent, make parallel, etc.) Pull face, Dimension commands, Reuse commands (copy/paste faces), Pattern Face, Offset region, Replace face, Delete face	**8**

Course Content for PDV Lab

4.	**NX Synchronous Modeling and Parametric Design:** Documenting design intent (Layers, Feature sets, Product Interfaces), Editing parametric models (Replace features, Suppression, model updates), Associative curve operations (Project, Join, Intersect, Wrap/Unwrap, Text), General pockets and pads (General, Emboss, Offset), Blending techniques (Overflow, Edge options, Face blends and options), Design optimization (Optimization study, options, algorithms), Synchronous Modeling (History and History Free Mode), Design intent and model	16

Course Outcome

- Student will be able to clear the basic concepts of computer aided design.
- Student will be able to do sketching, Part Modeling, Assembly and Drafting using NX CAD tool.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**NX CAD SHEET METAL**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

After successful completion of this course, user will be able to design sheet metal component with various industrial features.

Total No. of Lectures = 16

Lecture wise breakup		**Number of Lectures**
1.	**Sheet Metal tools;** Introduction, Typical sheet metal workflow, Preferences and defaults, Base feature tab, contour flange and lofted flange creation, Flange, Convert to sheet metal and flat solid,	**8**
2.	**Advance Features.** Bending sheet metal, Sheet metal corners, Edge rip, Jog, Sheet metal cut outs, Punch features dimple, drawn cut out and louver creation, Bead, Workbook projects.	**8**

Course Outcome

- Student will be able to clear the basic concepts of computer aided sheet metal design.
- Student will be able to do sketching, Part Modeling, Assembly and Drafting using NX CAD tool.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**Motion Simulation**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

After successful completion of this course, user will be able to simulate different type of motions and constrains for assemblies.

Total No. of Lectures = 20

Lecture wise breakup		**Number of Lectures**
1.	**Motion Simulation basics;** Introduction, Combine rigid bodies (links), joints, and motion drivers to create a mechanism. Manage multiple motion simulations- Apply forces, torques, springs, dampers, bushings, and contact in a motion simulation.	**8**
2.	**Edit simulation Features.** Edit both model and simulation features. Apply packaging options to generate feedback in the form of marker and component tracing. Critical measurements, and interference checking between the different components of assemblies.	**6**
	Advance Motion Simulation: Use spreadsheets and graphing to both animate and analyses a motion simulation. Use advanced solutions to simulate component flexibility. Use advanced solutions to simulate component flexibility, transfer loads for a finite element analysis, and control an electric motor.	6

Course Outcome

- Student will be able to clear the basic concepts of computer aided motion Simulation.
- Student will be able to do simulation of different types of components having variety of motions.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**Advance Simulation process.**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

After successful completion of this course, user will be able to Extensive geometry creation, idealization and abstraction capabilities enable the rapid development of complex 3D mathematical models that allow design decisions to be based on insight into real product performance.

Total No. of Lectures = 20

Lecture wise breakup		**Number of Lectures**
1.	**Introduction;** Introduction to FEA. Introduction to Advanced Simulation. Simulation Navigator. Selecting entities. Managing CAE analysis data.	**6**
2.	**Meshing and Boundary conditions:** Introduction to meshing, type of mesh, meshing control, geometry cleanup, mesh quality control. Setting boundary conditions. Boundary condition types and techniques.	**8**
3.	**Post-processing:** Solving- Post-processing. Geometry idealization, repair, and abstraction. Synchronous Modelling. Mesh collectors- Materials and physical – properties- Model quality- Reports	8

Course Outcome

- Student will be able to clear the basic concepts of computer aided motion Simulation.
- Student will be able to do simulation of different types of components having variety of motions.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**Advance Simulation processes and Solutions**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

After successful completion of this course, user will learn how to generate meshes, define materials, apply boundary conditions, solve, and review analysis results. Students will also learn techniques for setting up and generating structural, dynamic, and thermal analyses, using optimization, and working with large models.

Total No. of Lectures = 24

Lecture wise breakup		**Number of Lectures**
1.	**Introduction;** Introduction to Advanced Simulation. Managing CAE analysis data Selecting entities. Preparing a model for analysis.	**8**
2.	**Meshing and Boundary conditions:** Preparing a model for analysis. Meshing and mesh quality. Boundary condition- Post-processing and reports- Materials and physical properties. Linear and nonlinear static analysis- Modal, thermal, and buckling analysis. Response simulation, Contact and Symmetry, Finite element modelling with assemblies Optimization, Adaptive meshing. Flexible body analysis.	**12**
3.	**Results:** Multi physics. Import and export of model data. Presentation.	4

Course Outcome

- Student will be able to calculate various stress on different type of components.
- Student will be able to do analysis of different types of components having variety of motions.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**NX CAE Intermediate**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

After successful completion of this course, user will learn how to generate meshes, define materials, apply boundary conditions, solve, and review analysis results. Students will also learn techniques for setting up and generating structural, dynamic, and thermal analyses, using optimization, and working with large models.

Total No. of Lectures = 40

Lecture wise breakup		**Number of Lectures**
1.	**Flow Simulation;** Overview of NX Flow- Fluid volume creation and meshing- Meshing and material properties- Flow initial conditions and boundary conditions- Flow solution options and solving- Post-processing specific for NX Flow- Flow mapping	**8**
2.	**Response Simulation:** Theory of single and multi-degree of freedom systems- Function creation and manipulation- Random vibration analysis- Transient vibration analysis- Response spectra analysis- Base excitation methods- Shock and drop analysis.	**16**
3.	**Thermal and Flow Analysis:** Introduction to Advanced Simulation- Managing CAE analysis data- Selecting entities- Preparing a model for analysis- Meshing and mesh quality- Boundary condition- Post-processing and reports- Materials and physical properties- Linear and nonlinear static analysis- Modal, thermal, and buckling analysis- Response simulation- Contact and gluing- Symmetry- Finite element modelling with assemblies- Optimization- Adaptive meshing- Super elements- Flexible body analysis- Acoustic analysis- Multi physics- Import and export of model data- Templates	16

Course Outcome

- Student will be able to calculate various stress on different type of components.
- Student will be able to do analysis of different types of components having variety of motions.
- Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Outcome
• Student will be able to calculate various stress on different type of components. • Student will be able to do analysis of different types of components having variety of motions. • Student will learn about industrial standards related to design and they convert their ideas into virtual products.

Course Content for PDV Lab

Course Name	**:**	**NX CAM Beginner**
Course Code	**:**	
Credits	**:**	
L T P	**:**	

Course Objective

Students will learn how to create fixed and variable axis tool paths. You will also be introduced to NX workflows for machining contoured parts, high-speed machining methods, milling holes and threads, milling turbine blade type parts, and on machine probing.

Total No. of Lectures = 32

Lecture wise breakup		**Number of Lectures**
1.	**CAM MANUFACTURING FUNDAMENTALS ;** Introduction and Overview- Part analysis for manufacturing- User Interface- Operation Navigator- Machine Coordinate System- Tooling Visualization/Verification- Post Processing/Shop Documentation- Planar/Cavity Milling- Drilling- Fixed Contour Area Milling- Face Milling- Text Engraving	**16**
2.	**CAM POST BUILDING TECHNIQUES :** NX Post – postprocessor- Building a postprocessor with the post builder- Units-only sub posts- Post Builder for wire EDM applications- Post Builder for 4-axis and 5-axis mills . Post Builder for lathe applications- Create mill-turn postprocessors- Tcl Basics for Post Builder- Custom commands- User-defined events and user-defined cycles- Post processing with a Siemens controller- Create a macro with Post Builder- A Guide to best practices of building a postprocessor	**8**
3.	**CAM TURNING MANUFACTURING PROCESS :** Defining part and blank geometry- Retrieving and creating tools- Facing operations- Tool Path Verification- Common options- Centerline operations- Roughing operations – OD- Roughing operations – ID- Finish operations OD and ID- Grooving- Teach mode- Threading operations- Using Multiple Spindles- Mill-turn- Merging lathes- Vertical turret lathe	8