Computer Numerical Control of Machine Tools - Web course

COURSE OUTLINE

Introduction to Numerical Control - Computer Aided Manufacturing – Components of CNC system – Types of CNC systems – Open loop and closed loop control systems, Drives and Controls – Interpolators; CNC machine tools - Constructional features – Design considerations – Tooling for CNC.

CNC part programming – Manual and computer assisted part programming; CAD/CAM systems.

Programmable Logic Controllers (PLC) – Hardware, Ladder logic programming of PLCs using basic functions – Timers and counters – Advanced programming with control and arithmetic instructions.

COURSE DETAIL

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<tr>
<th>Sl. No</th>
<th>Topic</th>
<th>Hours</th>
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<tbody>
<tr>
<td>1.</td>
<td>Introduction to Automation – Goals of Automation, levels of automation, Hard Vs Soft Automation, Computer Aided manufacturing (CAM).</td>
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<td>3.</td>
<td>Basic Components of CNC system - Part programming, Machine control unit, Machine tool - Historical developments and their role in control of machine tools, Classification of NC / CNC systems - Based on type of Control (PTP/CIL), method of programming, type of architecture - Hardwired / Softwired / Open.</td>
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<td>4.</td>
<td>Machine Control Unit - Data processing Unit - elements and their functions - Interpolators and Sequential Controllers.</td>
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<td>5.</td>
<td>Interpolators - Types and Stages of Interpolation, Principles of interpolation - Techniques employed for Interpolation Scheme, Requirements of Interpolation algorithms, Interpolation schemes - Stairs approximation, Digital Differential Analyser, Direct function calculation; DDA - Hardware and Software; Software Interpolators.</td>
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<td>6.</td>
<td>Sequential controllers - Concepts, Relay ladder diagrams and their development.</td>
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Pre-requisites:  
- Manufacturing Technology.

Additional Reading:  

Coordinators:  
Prof. N. Ramesh Babu  
Department of Mechanical Engineering\IT Madras
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<th>Section</th>
<th>Page</th>
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<td>7.</td>
<td>Programmable Logic Controllers - Elements of Hardware and Software, Methods of programming - Ladder Logic Programmes (LAD), Function Chart (FC), Statement List (STL) - Program scanning and its execution.</td>
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<td>8.</td>
<td>Programming with Basic functions - Internal Relays, Timers, and Counters - different types and programming examples - Advanced functions and their applications.</td>
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<td>10.</td>
<td>Machine Tool - Componets of CNC machine tool, Drives and controls, Automatic Tool Changers, Automatic Pallet Changers, tool offsets and work offsets, high speed and precision machining concepts.</td>
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**References:**

