

# **AMMR-23 CNC PROGRAMMING**

## **UNIT-1 LITERATURE SURVEY**

- 1.1 Chronological Development of CNC Machine, Machining Time, Non-machining Time, Loading and Unloading Time

## **UNIT-2 INTRODUCTION TO CNC MACHINE**

- 1.1 Definition, Classifications of Numerical Control System, Advantages of CNC Machine,
- 1.2 Principle of Operation of CNC Machine , Open Loop CNC System , Closed Loop CNC System, Distance Measurement,
- 1.3 Axis Arrangement of CNC Machines , Types of CNC Machines, Configuration Of CNC Machines, Parts Construction of CNC Machines,
- 1.4 Coordinate Systems, Grid System, Reference Points, Machine Origin, Part Origin, Program Origin, Coding System, CNC Syntax ,
- 1.5 Computer Word Address Format, End of Block Code , Accuracy and Repeatability of CNC Machine

## **UNIT-3 CONSTRUCTION FEATURES OF CNC MACHINES**

- 3.1 Constructional Features of CNC Machines, Structure , Slide Ways, Spindle Drive , Feed Drive, Position Measuring Devices, Selection of CNC Machine,
- 3.2 Selection Guidelines , Choosing a Machining Center, Comparison Chart of Specification and Features of a Horizontal Spindle Machining Center,
- 3.3 Typical Specifications for a Horizontal Spindle Machining Center, Typical Format for Comparison of CNC System.

## **UNIT-4 CNC MACHINE OPERATING SYSTEM**

- 4.1 FANUC Operating System, Flow Chart of Automatic Operation,
- 4.2 Sinumerik / hinumerik Operating System, List of Operating Switches.

## **UNIT-5 PROGRAMMABLE LOGIC CONTROLLER (PLC) CHARACTERISTICS**

- 5.1 G-function (Preparatory Function), G-Codes , Cutter Compensation Function , Incremental Programming ,
- 5.2 Main Program ,Subprogram ,List of G-Function , List of M-function , Other Functions ,

## **UNIT-6 SETTING THE MACHINE**

- 6.1 Home Position , Coordinate System Preset, Tool Offset Consideration , Tool Length Offset , Tool Offset Adjustment,
- 6.2 Setting up Tools on the Lathe, Imaginary Tool Tip Method , CNC Turning Centre ,
- 6.3 Setting Work Coordinate System, Tool Offset, Tool data, setting up Tools on the Machining Centre.

## **UNIT-7 CNC PROGRAMMING**

- 7.1 CNC Machining Centre, CNC Turning Centre,

7.2 Automatically Programmed Tools (APT) Language, Motion Statements.

### **UNIT-8 CNC METAL CUTTING TOOLS**

8.1 Characteristics of Tool Materials, Cutting Tool Materials , Cutting Tool Material Chart, Calculation Formulae for Turning , Calculation formulae for Milling ,

8.2 ISO Designation of Tool, ISO Designation for Round Shank Tools, ISO Designation for Cartridges , Widax -gw Full Form,

8.3 ISO Designation for Index able inserts, Chart for Determining Spindle Speeds, Recommended Machining Parameters, Nomogram,

8.4 For Power/Machining Parameters, Widalon/Widadur/Widia Grades for Machining, Grades for Machining.

### **UNIT-9 TROUBLE SHOOTING OF MACHINING PROCESSES**

9.1 Drilling, Tapping, Reaming, Spot Facing, Turning, Boring, Milling

### **UNIT-10 INTRODUCTION TO FMS, CIM SYSTEM AND ROBOTS**

10.1 Flexible Manufacturing System (FMS), Computer Integrated Manufacturing (CIM), Robots

#### **Reference Books:**

1. CNC Programming: Principles And Applications By Mattson, Cengage India Books from same Author: MATTSON
2. CNC Fundamentals and Programming 2/e PB Paperback – 1 January 2014 by Agarwal (Author)