

(ME 551) COMPUTER NUMERICAL CONTROL MACHINES**Objective of the Course:**

To train the students in part programming for CNC machine tool operations and make them familiar with CNC machines control.

UNIT - I

Introduction: Classification of CNC machines Centres-Turning, Milling, Grinding; Gear-hobbing, CNC System Overview, CNC Machine Components.

UNIT - II

Constructional Features of CNC Machine Tools: Spindle drives of CNC machine tools, Transmission belting, Axes feed drives, Slide-ways for machines, Bearings, Ball Screws, Accessories of machining centers, Accessories and Constructional Features of CNC Lathes.

UNIT - III

Manual Part Programming: Programming aspects of Machining Centres, Preparatory Functions (G-Functions), Miscellaneous Functions (M-Functions), Programming Codes, Examples of Machining Centres.

Computer Aided Part Programming (CAPP): Languages for CAPP- APT language, Geometric Statements in APT, Point-to-Point Programming, Programming a Tool Path, Motion Commands, Post Processor Statements, Part Programming examples in APT.

UNIT - IV

Adaptive Control Systems: Introduction, Adaptive Control with Optimization, Adaptive Control with Constraints, Variable-Gain AC Systems, Cost Analysis in Machining.

UNIT - V

Feedback Devices in CNC Machine Tools: Digital incremental displacement measuring systems-rotary encoders, Moire Fringes; Digital absolute Measuring systems, Electro-Magnetic Analogue position Transducers- Synchros and Synchro-Resolvers; Inductosyn, Laser Interferometer.

Tooling for CNC Machines: Preset and Qualified Tools, Tool Holders, Tool Holders for Machining Centres, Use of special tool Holders, Tool Planning, Work Holding.

TEXT BOOKS:

- 1) P. Radhakrishnan, "Computer Numerical Control (CNC) Machines", 1st Edition, New Central Agency (P) Ltd., 1989.
- 2) Koren, "Computer Control of Manufacturing Systems", 1st Edition, Tata Mc Graw Hill, 2005.

REFERENCE BOOKS:

- 1) M. P. Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", 3rd Edition, Prentice Hall Publication, 2008.
- 2) M. Lynch, "Computer Numerical Control for Machining", 1st Edition, Tata McGraw Hill, 1992.