AMPR20 MECHATRONICS

UNIT-1 INTRODUCTION

1.1 What is Mechatronics?

1.2 Scope of Mechatronics, Key Issue

UNIT-2 INTRODUCTION TO MODERN CNC MACHINES AND MANUFACTURING SYSTEMS

2.1 Introduction, Advantages of CNC Machines, CNC Machining Centre Developments,

2.2 Turning Centre Developments, Tool Monitoring on CNC Machines,

2.3 Other CNC Developments, Advanced Manufacturing Systems,

2.4 Benefits of an FMS, Trends in Adoption of FMSs

UNIT-3 ELECTRONICS FOR MECHANICAL ENGINEERS

3.1 Conductors, Insulators and Semiconductors, Passive Components used in Electronics,

3.2 Transformers, Semiconductors, Transistors, Silicon Controlled Rectifiers (SCR),

3.3 Integrated Circuits (IC), Digital Circuits

UNIT-4 DESIGN OF MODERN CNC MACHINES AND MECHATRONIC ELEMENTS

4.1 Machine Structure, Guideways, Feed Drives, Spindle/Spindle Bearings,

4.2 Measuring Systems, Controls, Software and User Interface, Gauging, Tool Monitoring System

UNIT-5 DRIVES AND ELECTRICALS

5.1 Drives, Spindle Drives, Feed Drives, DC Motors, Servo-principle ,

5.2 Drive Optimization ,Drive Protection,

5.3 Selection Criteria for AC Drives, Electric Elements,

5.4 Wiring of Electrical Cabinets Power Supply for CNC Machines,

5.5 Electrical Standard, Electrical Panel Cooling

UNIT-6 CNC SYSTEMS

6.1 Configuration of the CNC System, Interfacing, Monitoring, Diagnostics,

6.2 Machine Data, Compensations for Machine Accuracies, PLC Programming,

6.3 Direct Numerical Control (DNC)

UNIT-7 PROGRAMMING AND OPERATION OF CNC MACHINES

7.1 Introduction to Part Programming, Coordinate System, Dimensioning, Axes and Motion nomenclature, Structure of a Part Program,

7.2 Word Addressed Format, G02/G03 Circular Interpolation, Tool Compensation , Subroutines (Macros) , Canned Cycles (G81-G89),

7.3 Mirror Image, Parametric Programming (User Macros) and R-Parameters , G96 S... Constant Cutting Speed and G97 Constant Speed,

7.4 Machining Cycles, Programming Example for Machining Centre, Programming Example for Turning Centre.

UNIT-8 INDUSTRIAL DESIGN, AESTHETICS AND ERGONOMICS
8.1 Introduction, Elements of Product Design,
8.2 Ergonomic Factors for Advanced Manufacturing Systems

UNIT-9 INTRODUCTION TO COMPUTERS AND CAD/CAM
9.1 Introduction to Computers, CAD/CAM Systems,

Reference Books:
1. "Principles, Concepts and Applications – Mechatronics" by Nitaigour and Premchand Mahilik
2. "Mechatronics" by W Bolton.