GUJARAT TECHNOLOGICAL UNIVERSITY
MECHATRONICS ENGINEERING
B. E. SEMESTER: VII

Subject Name: **Automated Manufacturing - I**
Subject Code: **172002**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	**INTRODUCTION:** Automation and types, Brief history of NC, CNC and DNC machines, Explanation of execution system, Basic configuration of machine, Capabilities and Limitations, Intelligent Manufacturing, Recent Trends.	4
2.	**MOTION CONTROL AND MACHINE ELEMENTS :** Ball screws, Linear Motion Guide ways, Hardened and ground guide ways, Turcite – B coating, Spindle Bearings, Air Bearings, Hydrostatic and Hydrodynamic Bearings, Tool Clamping systems, Servo motors and their applications, Feedback systems, Tachos, Encoders, Linear Glass Scales.	5
3.	**ACCESSORIES AND OTHER ESSENTIAL PERIPHERALS :** Automatic Tool Changer (ATC), Automatic Pallet Changer (APC), Coolant system, chip conveyor system, Auto part loading devices, In process measuring systems, Touch probes and non contact type measurements.	3
4.	**BASIC PART PROGRAMMING :** Axes identification , movements and interpolation with other axis, Application of rotary axis, Manual programming – offline, Programming formats, Tool offsets , Type of compensations and cutting parameters, Introduction to G codes and M codes.	13
5.	**MATERIAL HANDLING AND STORAGE:** Types, characteristics, Automated Guided Vehicle systems (AGVs), guidance, routing and control, Automated Storage and Retrieval systems (AS/RS), Components, Controls and applications, Integration of automated material handling and storage systems to manufacturing environment.	04

6.	**COMPUTER AIDED PROCESS PLANNING (CAPP):** Need, types, benefits, Computerized machinability database systems.	4
7.	**ACCURACY AND MEASUREMENT STANDARDS:** Errors, Positional accuracies and repeatability, Static Accuracy tests, Axis calibration by laser, Ball bar test	2
8.	**HIGH SPEED MACHINING:** An overview, Areas of application for HSM, Prerequisites of HSM, Merits and Demerits of HSM.	3
9.	**RAPID PROTOTYPING:** An overview, Applications, Methods and Working, Limitations	2

List of Experiments:

1. Introduction to NC, CNC & DNC machines.
2. Operation with single turning cycle (G90) for simple turning and step turning.
3. Use of single turning cycle (G90) for taper turning on XLTURN center.
4. Use of Simple and taper facing cycle (G94) on XLTURN center
5. Use of Drilling, Grooving and Threading cycles on XLTURN center.
6. Use of Multiple Turning stock removal, multiple facing stock removal and Pattern repeating cycles on XLTURN center.
7. Circular interpolation by G02 and G03 on STAR MILL with Incremental and absolute programming.
8. Cutter Compensation on STAR MILL.
9. Use of mirroring command on STAR MILL.
10. Use of Circular and Rectangular pocketing cycles on STAR MILL.

Text Books:

1. Automation Production systems and Computer Integrated Manufacturing, 2nd Edition
   Groover M.P.
   Prentice Hall of India

2. CNC Fundamentals and Programming
   P. M. Agrawal &V. J. Patel
   Charotar Publishing House Pvt. Ltd.

Reference Books:

1. Numerical Control & Computer Aided Manufacturing
   Kundra T.K. Rao P.N. Tewari N.K.
   Tata McGraw Hill

2. Mechatronics
   HMT
   Tata McGraw Hill

3. CNC Technology and Programming
   Steve Krar and Arthur Gill
   McGraw Hill International

4. Computer Control of Manufacturing systems
   Koren Y.C.
   McGraw Hill