

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER - II

MECHATRONICS ENGINEERING

Subject Name: **Futuristic Manufacturing Systems (Institute Elective II)**
 Subject Code: **1724709**

Sr.	Course Contents	Total Hrs
1.	FUNDAMENTALS OF ROBOTICS: Introduction to Robotics and Robot Applications, Fundamentals of Robot Technology, Robot Anatomy & Precision of movement, Work volume, Drive systems, Control Systems, Robot and its peripherals, End effectors and its types, Sensors in Robotics, Introduction to HEXAPOD.	08
2.	KINEMATICS OF ROBOTIC MANUPULATORS: Introduction to manipulator Kinematics, homogeneous transformations and robot kinematics, concept of forward and inverse kinematics, Denavit-Hartenberg (D-H) representation. Robot programming & languages, Trajectory planning of robot motion. Robot vision system.	07
3.	ROBOTS IN MANUFACTURING: Robot Cell Design, robot Cell layout, Multiple robots and machine interference, work cell control, robot cycle time analysis, Economic analysis of robot, Material transfer, Machine loading/unloading, Application in welding and other processes.	04
4.	FLEXIBILITY IN MANUFACTURING: Definition & concept, flexible automation & productivity, components of FMS, Different types of FMS, Design problem of FMS, Technology required for FMS system. Robots - their function & programming in FMS.	05
5.	GROUP TECHNOLOGY: Part family, Part classification and coding, production flow analysis – OPITZ classification system, ROC, SLCA, cellular manufacturing, quantitative analysis in cellular manufacturing, Holier Method-I,II.	05
6.	COMPUTER INTEGRATED MANUFACTURING AND AUTOMATION: Elements of CIM, Design aspects of CIM, CIM planning and implementation, requirements of CIM, Computerized production activities, Computerized integrated quality concept, Inventory management and shop floor control, Production costing, Just in Time Manufacturing, Manufacturing control	05
7.	COMPUTER AIDED PROCESS PLANNING (CAPP): Need, types, benefits, Computerized machinability database systems	03
8.	RAPID PROTOTYPING AND HIGH SPEED MACHINING: An overview, Applications, Methods and Working, Limitations, An overview, Areas of application for HSM,	03

Text Books:

1. M. P. Groover, Mitchell Weiss, Roger N. Nogel, Nicholas G. Odrey
Industrial Robotics: Technology Programming & Applications
McGraw Hill International
2. M. P. Groover
Automation, Production Systems and Computer Integrated Manufacturing
Prentice Hall of India
3. Mohsen Shahinpoo
A Robot Engineering Textbook
Harper & Row Publishers

Reference Books:

1. Saeed B. Niku
Introduction to Robotics: Analysis, Systems, Applications
PHI publishers
2. S. R. Deb
Robotics Technology & Flexible Automation
Tata McGraw Hill
3. R.K. Mittal, I.J. Nagrath
Robotics and Control
Tata McGraw-Hill
4. James G Keramas
Robot Technology
DelMar Publishers