

B.E. MECHANICAL 2008 Course

Industrial automation

402050D Open elective for Mechanical Branch (UoP)

Teaching Scheme: 4hrs/week

Exam. Scheme: Theory 100marks

Unit 1:

Basics of Automation

Evolution and Benefits of Automation, Feedback and Feed forward control System. Review of control System Components such as transmitters, converters and final control elements, Hierarchical levels in Automation systems, Introduction to Automation tools

Unit 2:

Programmable Logic Controllers

Review of PLC block diagram, components, architecture, scan cycle, introduction to IEC 61131 standard, Programming Languages, 7step method, Ladder development for application using relay instructions. PLC programming with applications

Introduction to DCS, hierarchical control structure, various function blocks, communication protocol basics.

Unit 3:

Integration of Manufacturing Systems

Communications, Communication methods, Direct Numerical Control, Communication standards.

Material handling systems: Automatic guided vehicles, Robots, Automated storage system

FMS and CIM: Introduction to FMS, Tool management system, FMS control, FMS case study, Computer integrated manufacturing.

Unit 4:

SCADA and HMI

Introduction to SCADA, SCADA features, SCADA configuration, alarms and trends, Introduction to HMI, Difference/ comparison SCADA and HMI.

Database management, reporting, alarm management, diagnosis, Historical database management, security and user access management, communication, third party interfaces ; control, display

Unit 5:

Drives and Motion Controllers

Hydraulic, Pneumatic, Electrical Drives: Induction motor, Stepper motor, VFD, DC servo, BLDC and their control

Automation strategies, Selection of drives, Mechanisms for movement of product like Geneva mechanism, rotary table mechanism etc.; Numericals on line balancing

Unit 6:

Automation in Manufacturing

Material Transfer, Machine Loading and Unloading, Processing Operations, Part Presentation Methods, Remote Center Compliance(RCC)Device, Assembly Automation, Assembly System Configurations, Plant Survey to identify potential application, Installation, Advanced Sensors, Universal Hand.

Case studies and development of logic for applications related to mechanical industries such as Drilling machine, NC/CNC machines, Conveyor belts etc.

Books:

Programmable Logic Controllers: Garry Dunning, 3rd Ed, PHI Pub. 2004

Programmable Logic Controllers: Webb

Standard Handbook of Industrial Automation Douglas Considine

Instrument Engineers' Handbook, Bela' Liptak

CAD/CAM Principales and Applications P N Rao, Tata Mc-Graw Hill Company Ltd.

Industrial Robotics by Mikell P. Groover et al, Mc-Graw Hill International Edition.