AUTOMATION IN MANUFACTURING SYSTEMS

Course Code: 15ME2103

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Course Outcomes: At the end of the course, the student will be able to

CO1: Identify and correlate the concepts of automation in production systems.

CO2: Explain various models and petrinets used in automated manufacturing systems

CO3: Identify various sensors and actuators used in industrial control systems

CO4: Identify various components of hydraulic and pneumatic systems in industrial applications

CO5: Demonstrate knowledge on various input and output models used in PLC processor

UNIT – I (10-Lectures)

Fundamentals of manufacturing: production system facilities, manufacturing support systems, different types of manufacturing systems, automation in production systems, automation principles & strategies, manufacturing operations and production relationships

Mathematical concepts & models: production concepts & mathematical models, costs of manufacturing operations, numerical problems

UNIT – II (10-Lectures)

Automation and modeling automated manufacturing systems: basic elements of automated system, advanced automation functions, levels of automation, performance modeling tools, Markov chain models, quenching models, petrinet models, types of petrinets, differences between simple petrinets and high level petrinets

UNIT – III (10-Lectures)

Industrial control and process planning: industrial control systems, sensors, actuators & other control systems, discrete control using PLC & PLC network, manufacturing support systems, CAPP, advanced manufacturing, planning, lean production & agile manufacturing

UNIT – IV (10-Lectures)

Power hydraulics & pneumatics: concepts features & parameters governing the selection of various components necessary for building the elements, circuit design & analysis

Industrial applications of fluid power & pneumatic systems, electro-hydraulic servo system, fluid logic control

UNIT – V (10-Lectures)

PLC: Introduction, micro PLC, programming a PLC, logic functions, input & output modules, PLC processors, PLC instructors, documenting a PLC system, timer & counter instructions, comparison & data handling instructions, sequencing instructions, mask data representation

Typical PLC programming exercises for industrial applications and case studies

TEXT BOOKS:

1. M.P. Groover, "Automation, Production Systems and Computer Integrated Manufacturing", Pearson and PHI, 3rd Edition, 2009
2. N Viswanandham and Y Narahari, "*Performance Modeling of automated Manufacturing Systems*", IISc. Bangalore, PHI, New Delhi

REFERENCES:

1. Goodwin, "*Fluid Power System*", - McGraw Hill Press Limited, 1992
2. Histand B.H., Alciatore D.G., "*Introduction to Mechatronics and Measurement Systems*", 3rd edition, Tata McGraw Hill Publishing Company Ltd, 2007
3. Bolton W., "*Mechatronics – Electronics Control Systems in Mechanical and Electrical Engineering*", 4th edition, Pearson Education Press, 2010