COMPUTER AIDED MANUFACTURING

II Semester

Course Code: 19ME2105

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Course Outcomes: At the end of the course, the student will be able to
CO1: Explain NC, CNC, DNC and other system devices.
CO2: Discuss the different features of NC machine tools and programmable logic controllers.
CO3: Develop NC part program for various machining operations.
CO4: Describe the application of adaptive control in CNC machine and other manufacturing.
CO5: Use different quality control equipment.

UNIT-I **(10-Lectures)**

Introduction: Basic components of NC system, coordinate systems, classification of NC motion control system, CNC, DNC, applications of NC, analysis of positioning system.

System devices: sensors, actuators, analog to digital convertor, encoder.

Learning outcomes:
1. Identify basic components of NC system and coordinate systems. (L1)
2. Explain NC control systems and applications. (L2)
3. Classify different types of system devices. (L4)

UNIT-II **(10-Lectures)**

Features of NC machine tools: Design considerations of NC machine tool, machining center, turning center, mode selection, cutter radius and tool length compensation.

Programmable logic controllers: Components of PLC, programming the PLC, programmable automation controllers.

Learning outcomes:
1. Explain the design considerations of NC machine, machining and turning center. (L2)
2. Demonstrate modes of operation, cutter radius and tool length compensation in CNC. (L3)
3. Discuss PLC programming and controllers. (L2)

UNIT-III **(10-Lectures)**

NC part programming: Preparatory function, miscellaneous function, interpolation, canned cycle, manual part programming for drilling, milling and turning operations, Programming examples.

Learning outcomes:
1. Use NC part programming codes. (L3)
2. Generate part program for drilling and milling operations. (L6)
3. Develop part program for turning operations. (L6)

UNIT-IV **(10-Lectures)**

Adaptive control systems: sources of variability in machining, benefits of adaptive control, adaptive control with optimization, adaptive control with constraints.

Rapid prototyping-basic process, techniques, applications, reverse engineering, agile manufacturing.

Learning outcomes:

1. Outline adaptive control systems with optimization and constraints. (L4)
2. Describe process, techniques and applications of rapid prototype. (L2)
3. Summarize reverse engineering and agile manufacturing. (L5)

UNIT-V **(10-Lectures)**

Inspection Technologies: Inspection fundamentals, Contact and noncontact inspection techniques, Coordinate measuring machine, surface measurement, machine vision, laser system, six sigma.

Learning outcomes:

1. Differentiate between contact and noncontact inspection techniques. (L2)
2. List different types of CMM. (L1)
3. Summarize surface measurement, machine vision, laser system and six sigma. (L2)

TEXT BOOKS:

1. Mikell P. Groover, *Automation, Production Systems and Computer Integrated Manufacturing,* 4th Edition, pearson, 2018.
2. Sadhu Singh, *Computer Aided Design and Manufacturing*, Khanna Publisher, 2015.

REFERENCE BOOKS:

1. Yoram Koren, *Computer Control of Manufacturing Systems*, TMH, 2017.
2. P.N. Rao, *CAD/CAM*, 3rd Edition, TMH, 2010.
3. D S N Murthy, *CNC Applications & Programming Techniques*, 1st Edition, Goutam publications, 2003.