BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI,
HYDERABAD CAMPUS
SECOND SEMESTER 2022-2023
Course Handout (Part II)

Date: 16.01.2023

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : ME F432
Course Title : Computer Aided Manufacturing
Instructor-in-charge : Kurra Suresh

1. Scope and objective of the Course:

To increase the productivity, industry has tried to apply more computerized automation in manufacturing. This has led to an increased number of computer-controlled machine tools, an appearance of industrial robots in the production lines. This trend towards computerized manufacturing is leading to a demand for appropriately trained engineers to design and maintain these systems. The course aims to provide an introduction to the theory and applications of control in the manufacturing area. It presents concepts of computer control as applied to stand-alone manufacturing systems (such as Machine tools and industrial robots) computer aided process planning, production control, inspection & quality control and provides a useful approach to their implementation. Projects using CAD/CAM software (PRO-E, CATIA) and CNC machines demonstrations are highlights of the course.

2. Text Book:

1. Yoram Koren., "Computer Control of Manufacturing Systems", McGraw-Hill International edition, 1985.

Reference Books:

1. Peter Smid, “CNC Programming Handbook”, Industrial Press, 2007
2. Ibrahim Zeid, “Mastering CAD/CAM”, Tata McGraw-Hill, New Delhi
3. P.N. Rao, N.K. Tewari, and T.K. Kundra., "Computer Aided Manufacturing", Tata McGraw-Hill, New Delhi.

3. Course Plan:

Lec. No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-2	Introduction	• Basic concepts of manufacturing • Fundamentals, advantages • Classifications of NC systems	T1-1
3	To introduce features of NC machine tools	• Design considerations of machine tools • Methods of improving accuracy • Increasing productivity with NC machines • Machining Centres, MCU functions	T1- 2
4	To equip students with NC Part Programming skills	• Introduction • Manual Programming	R1
5-8	Part Programming - Mill	• Manual Programming - Milling	R1

8-12	Part Programming - Lathe	• Manual Programming - Lathe	R1
12-13	Introduction to CAD	• Curves and surfaces • Geometric transformations	R2
14-16	Machining of freeform surfaces	• Toolpath generation • 5 and 4 axis machining	Class notes
		•	
17-18	To introduce various CAM system devices	• Drives • Feedback devices • Counting devices, • Digital to Analog converters • Hydraulic Systems	T1-4
19-20	To make familiar students with Interpolators	• DDA integrator • DDA Hardware interpolator • CNC software interpolators • Software DDA interpolators	T1-5
21	CNC Tooling	• Cutting tools • Work holding devices • Cutting process parameter selection	Class Notes
22	To introduce Adaptive Controls	• Introduction • Adaptive Control with optimization • Adaptive control with constraints	T1-8
23	To make students to grasp Industrial Robots fundamentals	• Basic concepts in Robotics • The manipulator • The control and drives	Class Notes
24	To introduce robot programming and economic aspects	• Robot programming • Intelligent robots • Economics • Applications of robots	R3
25	To explain use of computers in process planning	• What is process planning • Computer Aided Process Planning (CAPP) • Group Technology • Application programs	R3
26	To introduce Rapid Prototyping	• Introduction to free form fabrication • RP Techniques	Class Notes
27	To explain use of computers in inspection and quality control	• Quality assurance & quality control • SQC • Coordinate measuring machine, Non-contact inspection	R3
28	To make students familiar with CIM architecture	• Hierarchical computer control • DNC systems • The Manufacturing Cell • Flexible Manufacturing	T1-10

		Systems • The factory of the future	

4. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid-Test - 1	1hr	30	14/03 11.30 - 1.00PM	CB
Compre. Exam.	3 hrs.	40	10/05 AN	CB
Term paer/Lab		30		OB

5. Chamber Consultation Hours: To be announced in the class.

6. Notices:
Notices, if any, concerning the course will be displayed on the CMS only.

7.Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge

ME C432