BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

INSTRUCTION DIVISION
SECOND SEMESTER 2015-2016
Course Handout (Part II)

Date: 07/01/2016

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 : **Tufan Chandra Bera**
Instructor (Practical) : **Manikandan H.**

1. Course Description:

Introduction, features of NC machine tools, NC part programming, CAM system devices, interpolators for manufacturing systems, control loops of NC systems, computerized numerical control, adaptive control systems, CAD to CAM, CAPP, industrial robots, computer aided production planning & control, computer aided inspection and quality control, CIM systems.

2. Scope and objective of the course:

To increase productivity and obtain quality product, it has been decided by many industries from small to large scale to adapt computer controlled automation in shop floor. It leads to implementation of CAD/CAM knowledge, CNC machine tools and industrial robot in various manufacturing areas. Even in the present era, for survival point of view in global competition, CAD/CAM tool is compulsory for product manufacturing industries. They need trained and competent manufacturing engineer with CAD/CAM knowledge from design to part manufacturing. The course aims to provide an introduction to the theory and practice CNC machine tools and product manufacturing in shop floor. It presents CNC aspects in manufacturing, CNC programming, Hardware in CNC machine tools, Process Planning in manufacturing systems and automated inspections.
Projects using CAD/CAM softwares (CATIA, PRO-E), programming and machining on Industrial Vertical Machining Center (KODI-40 KLIEN), CNC Lathe are also included in the course.

3. Text Book:

T. P.N. Rao, CAD/CAM Principles and Applications, Tata McGraw-Hill, New Delhi, 2003

4. Reference Books:

R1. Yoram Koren, Computer Control of Manufacturing Systems, McGraw Hill International Edition, 1985.
R2. T. C. Chang, R. A. Wysk, H. P. Wang, Computer Aided Manufacturing, Pearson Education, Third Edition
R3. P. N. Rao, N. K. Tiwari, T. K. Kundra, Computer Aided Manufacturing, Tata McGraw Hill, New Delhi, 2012
R4. G. E. Thyer, Computer Numerical Control of Machine Tools, Heinemann Professional Publishing, 1988.
R5. Peter Smid, CNC Programming Handbook, Industrial Press Inc, New York, First Edition.
R6. M.P. Groover, Automation, Production Systems and Computer Integrated Manufacturing, PHI, New Delhi 1995.
R7. M. Groover, E. Zimmers, CAD/CAM Computer Aided Design and Manufacturing, Pearson Education

5. Course Plan:

Lect. No.	Objective	Topics	T/R-Chapter
1-3	Introduction	Basic concepts of manufacturing system, importance of CAM, advantages and disadvantages, classifications of NC systems, CNC aspects in manufacturing	T-1&9, R1, R2
4-5	To introduce features of NC machine tools	Design considerations of NC machine tools, automatic tool changer, turning centers and machining centers	T- 10-12, R3, R4
6-7	To explain control loops of NC system	Control of point to point systems and contouring systems	T- 10-12,
8-10	To introduce Computerized Numerical Control	The digital computer, reference pulse technique, sampled data technique, microcomputers in CNC	T- 10-12, R2 R3
11-14	To study various CAM system devices	Drives, Feedback devices, hydraulic systems	T-10-12, R1-4
15-17	To be familiar with interpolators for CNC manufacturing systems	Hardware and software based interpolator in CNC system	R1-5
18-22	To comprehend NC Part programming and develop programming skill	Manual programming using G & M codes, Turning Center programming, Computer aided programming, APT programming, other programming systems.	T-13-15, R4, R5
23-24	To be familiar with DNC and Adaptive control	DNC and Adaptive control Adaptive control with optimization (ACO), adaptive control with constraints (ACC)	R1-8
25-26	To introduce CAD to CAM	Automated tool path generation from CAD model	T-16
27-29	To make students to grasp industrial robots fundamentals	Basic concepts in Robotics, the manipulator, controls and drives, intelligent robots, economics, applications of robots	R1-9
30-32	To explain the use of computers in process planning	Process planning, Computer Aided Process Planning (CAPP), application programs	T-18
33-36	To acquaint with computer aided PPC	Computer aided inventory control and MPC	T-19
37-38	To explain the use of computers in inspection and quality control	Quality assurance & quality control, Coordinate measuring machine (CMM), Non-contact inspection, shop floor control and automatic identification techniques	T-23
39-40	To introduce CIM architecture	Hierarchical computer control, DNC systems, The factory of the future	T-24

6. Evaluation Scheme:

Component	Duration	% Weightage	Date & Time	Remarks
Mid Semester Test	90 min	30	14/3 2:00 -3:30 PM	Open book
PPT Presentation, Class assignment, Surprise Quiz etc.		10		Closed book
Comprehensive Examination	3 hours	40	10/5 FN	Closed book
Lab Practical & Projects	Semester long	20		Lab Experiments, Part modeling, programming and machining on CNC

7. Chamber Consultation Hours:

To be announced in the class.

8. Notices:

All notices related to the course will be displayed on Mechanical Engineering Department notice board only.

9. Make-up Policy:

Make-up will be granted **ONLY** in genuine cases with prior permission. The request application for make-up test **MUST** be reached to the Instructor-in-charge before commencement of the scheduled test along with **DOCUMENTARY PROOF**. No make-up will be allowed for the Surprise Quiz Tests.

Instructor-in-Charge
ME F432