ATOE 330: CNC Technology

(02 credits – 50 marks)

Course Outcomes:
On completion of the course, students should be able to –

CO1	1 Define the basic of CNC machine.
CO2	2 Apply Features of CNC Machines and Retrofitting
CO3	3 Design CNC part programming.
CO4	4 Describe types of measuring systems in CNC machines.

Course Contents:

Module -I: Fundamentals of CNC Machines (5 Hours)
Introduction to Computer Numerical Control: CNC Systems – An Overview of Fundamental aspects of machine control, Different types of CNC machines – Advantages and disadvantages of CNC machines.

Module –II: Constructional Features of CNC Machines and Retrofitting (7 Hours)
Features of CNC Machines: Structure, Drive Mechanism, gearbox, Main drive, feed drive, Spindle Motors, Axes motors. Timing belts and pulleys, Spindle bearing – Arrangement and installation. Slide ways. Re - circulating ball screws – Backlash measurement and compensation, linear motion guide ways. Tool magazines, ATC, APC, Chip conveyors. Retrofitting of Conventional Machine Tools: Modification to be carried out on conventional machines for retrofitting.

Module -III: Control System, Feed Back Devices and Tooling (6 Hours)
Description of a simple CNC control system. Interpolation systems. Features available in a CNC system – introduction to some widely used CNC control systems. Types of measuring systems in CNC machines – Incremental and absolute rotary encoders, linear scale – resolver – Linear inductosyn – Magnetic Sensors for Spindle Orientation. Qualified and pre-set tooling – Principles of location – Principles of clamping – Work holding devices

Module – IV: CNC Part Programming (5 Hours)
Part Program Terminology-G and M Codes – Types of interpolation Methods of CNC part programming – Manual part programming – Computer Assisted part programming – APT language – CNC part programming using CAD/CAM-Introduction to Computer Automated Part Programming. Factors influencing selection of CNC Machines – Cost of operation of CNC Machines – Practical aspects of introducing CNC machines in industries – Maintenance features of CNC Machines – Preventive Maintenance, Other maintenance requirements.

Module – V: Tutorials, Assignments, Demonstrations and Presentation Based On Module I to IV. (6 Hours)

References:

1. Radhakrishnan P., Computer Numerical Control Machines, New Central Book Agency 1992.
2. Berry Leatham – Jones, Computer Numerical Control, Pitman, London, 1987.
3. Steave Krar And Arthur Gill, Cnc Technology And Programming, Mcgraw–Hill Publishing Company, 1990. 46
4. Hans B.Kief And T.Frederick Waters, Computer Numerical Control Macmillan/Mcgraw-Hill, 1992.
5. G.E.Thyer, Computer Numerical Control Of Machine Tools. Second Edition, B/H Newnes, 1993.
6. Groover, M.P., Automation, Production Systems And Computer Integrated Manufacturing, Prentice Hall, 1998.
7. Mike Mattson, "Cnc Programming Thomson Learning, 2003. Me3306
8. Yoreur Koren, "Computer Control Of Manufacturing Systems", Pitman, London, 1987