In the course metal cutting and machine tools, gear cutting and CNC machine tools and processes, the students will be made familiar with metal cutting theory including cutting tool geometry, mechanism of chip formation, force analysis in the orthogonal cutting system, measurement of cutting forces – dynamometers, Theory of tool wear and tool life, Study of different machine tools: Lathe and Milling machine. Study of gear cutting on milling machine, gear shaping and gear Hobbing machines. Study of non-traditional machining : LBM, EDM, ECM, USM, AJM, AWJM Study of CNC machining. Study of Gear cutting : Introduction to gears, Different types of gears. Simple gear calculations involving numbers of teeth, rpm etc. Gear cutting on the milling machine with rotary disc type form gear milling cutter : Spur and Helical gear cutting with simple and differential indexing, calculation of change gear ratio Gear cutting on the gear shaper – calculation of speed gear box, feed gear box, index gear box ratios. Gear cutting on the gear hobbing machine (both straight spur and helical gears) – calculation of speed gear box, feed gear box, index gear box and lead change gear box. Computer numerical control : Introduction, Classification: Point to point and continuous control, open loop and closed loop control. Kinematic structure of CNC machine tools, different types of prime movers used, feedback devices Digital logic and use of digital logic in CNC machines Interpolation in CNC machines: Linear and circular interpolation Programming in CNC machine - programming on the CNC turning centre and machining centre CNC Free form surface machining with ball ended milling cutter on 3 axis machining centre – basic concepts.

About Instructor:

Course Plan:
Week 1: Introduction to metal cutting: Tool geometry
Week 2: Tool geometry, Mechanism of chip formation, orthogonal cutting, forces in metal cutting (orthogonal cutting)
Week 3: Theory of tool wear, machine tools : Lathe and milling machines
Week 4: Lathe and milling machines contd., Gear cutting machines, Non-traditional machining, CNC machining
Week 5: Introduction to gears, simples calculations involving gears
Week 6: Milling of gears, simple and differential indexing
Week 7: Helical gear cutting, gear teeth calculations
Week 8: Gear Shaping and Gear hobbing
Week 9: CNC – basic principals, classification, binary logic
Week 10: Features and devices of CNC machines, prime movers, feedback devices, programming
Week 11: Programming and Interpolation
Week 12: CNC Free form surface machining