Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

SYLLABUS FOR BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

(Effective from academic session 2018-19)

Subject Code : PC-ME601	**Category:** Professional Core Courses
Subject Name : Manufacturing Technology	**Semester**: Sixth
L-T-P: **4-0-0**	**Credit: 4**
Pre-Requisites: Primary Manufacturing Processes	

Course Objectives:

To impart knowledge to make students able to demonstrate the tooling needed for manufacturing, the dimensional accuracy and tolerances of products, assembly of different components. Also students will be able to understand the principles of working of NC, CNC machine tools and rapid prototyping.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Tooling for conventional and non-conventional machining processes: Mould and die design, Press tools, Cutting tools; Holding tools: Jigs and fixtures, principles, applications and design; Press tools: Configuration, design of die and punch; principles of forging die design.	12
2	Metrology: Metrology in tool wear and part quality including surface integrity, alignment and testing methods; tolerance analysis in manufacturing and assembly. Process metrology for emerging machining processes such as micro-scale machining, Inspection and workpiece quality.	8
3	Assembly practices: Manufacturing and assembly, process planning, selective assembly, Material handling and devices.	6
4	**NC/CNC Machine Tools and Systems** Types of automation: Fixed (or hard) and programmable (or flexible); need, advantages and applications of flexible automation over fixed automation. **Components and Their Functions in NC/CNC Machines** MCU, DPU and CLU, Feed drives using stepper/ servo motors and recirculating ball screw-nut system, Automatic Tool Changers- Tool Turret and Tool Magazine, Automatic pallet Changer. **Basic systems of NC and CNC machines** Coordinate system, Control– open loop and closed loop, Dimensioning– absolute and incremental, Point–to–point and contour motion, Linear and circular Interpolation. **CNC Machine Tools and Integrated Automation** Structure and working principle of CNC lathe, milling machine,	8

	Examples and use of CNC machines, Machining Centre (Vertical and Horizontal), Integrated Automation systems (DNC- Direct and Distributed or BTR and Dedicated system, FMS- FFMS, FMC and FMM)– characteristics and applications.	
5	**Part Programming for CNC machines** Manual Part Programming using ISO G and M Codes in CNC lathe and milling machine for simple jobs, Canned cycle. Computer Aided Part Programming using MACRO statements in APT for simple jobs in CNC lathe and milling machine.	8
6	**Rapid Prototyping** Overview of Rapid Prototyping, Basic Process- CAD Model Creation, Conversion to STL format, Slicing the STL File, Layer by layer construction. Use of CMM and 3-D Camera for making virtual model. Principles, systems, relative advantages and applications of the common RP methods, such as Stereo lithography (SLG), Selective laser sintering (SLS), Fused deposition modelling (FDM), Laminated objects manufacturing (LOM), 3-D Printing**.**	6

Course Outcomes:

1. To describe machines and related tools for manufacturing various components.
2. To understand the relationship between process and system in manufacturing domain.
3. To experiment on CNC machine tools.
4. To demonstrate rapid prototyping methods.

Learning Resources:

1. S. Kalpakjian and S.R. Schmid, Manufacturing Processes for Engineering Materials, 5th Edition, Pearson India, 2014.
2. R.K. Jain, Engineering Metrology, 21st Edition, Khanna Publication, New Delhi, 1984.
3. P.N. Rao, N.K. Tewari and T.K. Kundra, Computer Aided Manufacturing, McGraw Hill, 2017.
4. Y. Koren, Computer Control of Manufacturing Systems, McGraw Hill, 1986.
5. M.P. Grover, Fundamentals of Modern Manufacturing, 3rd Edition, Wiley.
6. M.P. Groover, Automation, Production Systems and CIM, Prentice Hall.
7. A. Ghosh & A.K. Mullick, Manufacturing Science, EW Press.
8. A. Ghosh, Rapid Prototyping, EW Press.