

MF5101 ADVANCES IN MANUFACTURING TECHNOLOGY

DETAILED SYLLABUS

UNIT I UNCONVENTIONAL MACHINING

Introduction-Bulk processes - surface processes- Plasma Arc Machining- Laser Beam Machining-Electron Beam Machining-Electrical Discharge Machining – Electro chemical Machining-Ultrasonic Machining- Water Jet Machining-Electro Gel Machining-Anisotropic machining-Isotropic machiningElastic Emission machining – Ion Beam Machining.

UNIT II PRECISION MACHINING

Ultra Precision turning and grinding: Chemical Mechanical Polishing (CMP) - ELID process – Partial ductile mode grinding-Ultra precision grinding- Binderless wheel – Free form optics. Aspherical surface generation Grinding wheel- Design and selection of grinding wheel-High-speed grindingHigh-speed milling- Diamond turning.

UNIT III ADVANCES IN METAL FORMING

Orbital forging, Isothermal forging, Warm forging, Overview of Powder Metal techniques –Hot and Cold isostatic pressing - high speed extrusion, rubber pad forming, Hydroforming, Superplastic forming, Peen forming-micro blanking –Powder rolling – Tooling and process parameters.

UNIT IV MICRO MACHINING AND NANO FABRICATION

Theory of micromachining-Chip formation-size effect in micromachining-microturning, micromilling, microdrilling- Micromachining tool design-Micro EDM-Microwire EDM- Nano fabrication:LIGA, Ion beam etching, Molecular manufacturing techniques – Atomic machining- Nano machining techniques – Top/Bottom up Nano fabrication techniques - Sub micron lithographic technique, conventional film growth technique, Chemical etching, Quantum dot fabrication techniques – MOCVD – Epitaxy techniques.

For Syllabus, Question Papers, Notes & many More

UNIT V RAPID PROTOTYPING AND SURFACE MODIFICATION

TECHNIQUES

Introduction – Classification – Principle advantages limitations and applications- Stereo lithography – Selective laser sintering –FDM, SGC, LOM, 3D Printing-Surface modification Techniques: SputteringCVD-PVD-Diamond like carbon coating-Plasma Spraying Technique.-Diffusion coatings-Pulsed layer deposition.

REFERENCES

1. Benedict,G.F.,"Non Traditional manufacturing Processes",CRC press,2011
2. Madou, M.J., Fundamentals of Micro fabrication: The Science of Miniaturization, SecondEdition, CRC Press (ISBN: 0849308267), 2006.
3. McGeough,J.A.,"Advanced methods of Machining",Springer,2011
4. Narayanaswamy, R., Theory of Metal Forming Plasticity, Narosa Publishers,1989.
5. Pandey, P.S. and Shah.N., "Modern Manufacturing Processes", Tata McGraw Hill, 1980.
6. Serope Kalpakjian., "Manufacturing Engineering and Technology" Pearson Education,2001

OBJECTIVE:

The students are expected to understand special machining processes, unconventional machining processes, micro machining process, nano fabrication processes and rapid prototyping.