

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VI

### MANUFACTURING ENGINEERING

**Subject Name: ADVANCED MANUFACTURING PROCESSES**

**Subject Code:163403**

| Teaching Scheme |          |           |       | Evaluation Scheme  |                          |                      |
|-----------------|----------|-----------|-------|--------------------|--------------------------|----------------------|
| Theory          | Tutorial | Practical | Total | University Exam(E) | Mid Sem Exam(Theory) (M) | Practical (Internal) |
| 3               | 0        | 3         | 6     | 70                 | 30                       | 50                   |

| Sr No    | Course Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | <b>Introduction</b><br>Unconventional machining process – Need – Classification – Brief overview of all techniques – Merits and demerits.                                                                                                                                                                                                                                                                                                                         |
| <b>2</b> | <b>Mechanical Energy Based Processes</b><br>Abrasive Jet Machining (AJM) – Water Jet Machining (WJM) – Ultrasonic Machining (USM) – Working principles – Equipment used – Process parameters – MRR – Variation in techniques used – Applications.                                                                                                                                                                                                                 |
| <b>3</b> | <b>Electrical Energy Based Process</b><br>Electric Discharge Machining (EDM) – Working Principles – Equipments – Process parameters – MRR – Electrode / Tool – Power circuits – Tool wear – Dielectric – Flushing – Wire cut EDM – Applications.                                                                                                                                                                                                                  |
| <b>4</b> | <b>Chemical And Electro Chemical Energy Based Process</b><br>Chemical Machining (CHM) – Electro-Chemical Machining (ECM) – Etchants – Maskant – Techniques of applying maskants – Process parameters – MRR – Applications – Principles of ECM – Equipments – MRR – Electrical circuit – Process parameters – ECG and ECH applications.                                                                                                                            |
| <b>5</b> | <b>Thermal Energy Based Process</b><br>Laser Beam Machining (LBM) – Plasma Arc Machining (PAM) – Electron Beam Machining (EBM) – Principles – Equipment – Types – Beam control techniques – Applications.                                                                                                                                                                                                                                                         |
| <b>6</b> | <b>CNC Machines</b><br>NC, CNC and DNC – Types of CNC – Constructional features – Drives and control systems – Feedback devices – Interchangeable tooling system – Preset and qualified tools – ISO specification – Machining center – Turning center.<br><br><b>CNC Programming:</b> Manual part programming – Steps involved – Sample program in lathe and milling – Computer aided part programming – APT program – CAM package – Canned cycles – Programming. |

#### TEXT BOOKS

1. Jain, V.K., “Advanced Machining Processes”, Allied Publishers Pvt. Ltd., 2002.
2. Jonathan Lin, S.C., “Computer Numerical Control from Programming to Networking”, Delmar Publishers, 1994.

## **REFERENCES**

1. Benedict. G.F., “Nontraditional Manufacturing Processes”, Marcel Dekker Inc., 1987.
2. Pandey P.C. and Shan H.S. “Modern Machining Processes”, Tata McGraw-Hill, 1980.
3. Mc Geough, “Advanced Methods of Machining”, Chapman and Hall, 1998.
4. Paul De Garmo, J.T.Black, and Ronald.A.Kohser, “Material and Processes in Manufacturing”, 8<sup>th</sup> Edition, Prentice Hall of India Pvt. Ltd., 2001.
5. Thyer, G.E., “Computer Numerical Control of Machine Tools”, BH.Newners, 1991.