



C.U.SHAH UNIVERSITY – WADHWANCITY

FACULTY OF: - Technology and Engineering (Diploma Engineering)

DEPARTMENT OF: - Mechanical Engineering

SEMESTER: - V

CODE: 2TE05MTT1

NAME OF SUBJECT: – Machine Tool Technology

Teaching & Evaluation Scheme:-

Subject Code	Name of the Subject	Teaching Scheme				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Mark s	Hour s	Mar ks	Hours	Pr/Viv a	T W	Pr	
<u>2TE05MTT1</u>	Machine Tool Technology	4	0	2	6	5	30	1.5	70	3	--	20	30	150

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Introduction to Machine Tools Technology: Need, Scope & importance of Machine tools technology in industries. List of major industries having machine tools in Gujarat. Need of attitude, knowledge & skill required for shop floor supervisor in Machine tools based industries. Recall fundamentals: definitions of machine tool, cutting speed, feed, depth of cut, metal removal rate, surface finish symbols and values, cutting tools and their geometry.	4
2	Grinding and Super Finishing Processes: Cutting action of Grinding Wheel. Grinding Wheels: Types, materials, nomenclature, selection criteria and applications. Terms associated with Grinding wheel operations. Grinding and super finishing operations and machines: definition, constructional features, working principles, cutting parameters for “commonly used grinding wheels and work piece materials” and applications of following machine tools-Surface (rotary and sliding) grinding machines, Cylindrical (centre less, internal, external) grinding machines, Bench and portable grinder, Tool and cutter grinding machine, Profile grinding, Honing, Lapping and Super finishing. Static and dynamic balancing of grinding wheels-need and Methods. Methods of mounting work piece on cylindrical grinding Machines (Including chuck and mandrel). Loading of grinding wheel.	12
3	Gear Manufacturing and Gear Finishing Processes: Nomenclature of spur and helical gear, types of gears. Generating and forming processes. Gear forming methods –Machine tools specification, working principles, process, cutting tools used with nomenclatures and cutting angles, cutting parameters. Gear generating methods like hobbing–Machine tools specification, working principles, process, cutting tools used with nomenclatures and cutting angles, cutting parameters. Gear finishing methods-methods and working principles.	10
4	Thread Production Methods: Various methods of thread productions, constructional features of thread production machines/processes, their working principles, cutting tools and cutting parameters, applications, advantages and limitations.	6
5	Broaching Machines: Need, types, constructional features and applications. Broaching methods. Shapes which can be broached. Special features and comparison.	4
6	Jig Boring Machine: Need, constructional features, working principle and applications.	2
7	Single Spindle and Multi Spindle Automats:	2

	7.1 Need, constructional features, working principle and applications.	
8	Special Purpose Machine Tools: Need, factors affecting constructional design and applications. Comparison of SPM with other automates.	4
9	Nonconventional Methods of Machining: Need, constructional features, working principles, tools, working parameters and applications: (ECM, EDM, WEDM, USM, ECG, AJM, Plasma beam, laser, plasma arc machining, Electro beam machining, chemical machining.)	8
10	CNC Machines (Computerized Numerical Control) Need of CNC. Concept of numerical control. Constructional features of CNC, elements of CNC and their functions with working principles.	4

List of Experiments:-

- **Introduction of exercises and job drawings.**
- **Demonstration and Study**
Kinematics and motion transmission of Cylindrical Grinding Machine, Kinematics and motion transmission of Broaching Machine, Kinematics and motion transmission of Gear hobbing and gear shaping machine, Tool changing on CNC using Automatic Tool Changer, Grinding various cutting tool angles on Tool and Cutter Grinding Machine.
- **Job Preparation**
Prepare a job on centre lathe as per the given drawing (Including plain turning, knurling, threading and grinding, Prepare a plain surface and inclined surface on shaping Also pre-drill and tap minimum two holes, Prepare a job having gear tooth cutting on milling machine using indexing head, Prepare a multi start/square thread job-bolt and nut (Including drilling, boring with internal threads, Prepare a report on process planning and route sheet with shop floor layout for given composite job.
- **Industrial/Exhibition Visit**
Visit at least three related industries and prepare a report. Also visit related exhibitions.
- **Visual Adds**
Collect / Download product catalogues with specifications of various cutting tools (Grinding wheels, Gear hob cutter, Gear shaping cutter, various Milling cutters, Reamers, Broaches, etc), Collect / Download product catalogues with specifications of various machine tools of recent trends including CNCs.
- **Mini Project**
Manufacture the assembly which has been designed in the course Design of Machine Elements Keep the same group. Student will prepare the report on following, Prepare production drawings of the assembly and details, Manufacture the parts, Note down work holding devices, cutting tools and cutting parameters used for each part and each operation. Summarized this in tabular form. On completion, present and share the experience of this mini project with photos/videos of mini project execution and with work distribution executed. Use power point presentation

Books Recommended:

- Machine tools technology, G. S. Kandaswami.
- Workshop Technology Vol. II, S. K. Hajara Chaudhry.
- Metal cutting technology & Experiments, K. G. Chaniramani.
- Production Engineering Sciences, Dr. P. C. Pande & C. K. Singh.
- The Art of Tool & Cutter Grinding, S. P. Narang.
- Production Technology, HMT.
- Production Technology, R. K. Jain.
- Modern Machining Processes, P. C. Pandey.
- Manufacturing Technology, Kalpak Jain.
- Workshop Technology Vol. I, II & III, W. A. J. Chapman.
- Manufacturing Processes , S. E. Rusinoff