4060 - MACHINE TOOLS AND PRODUCTION PROCESS - II

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credits			Theory		Practical Ex.	Total
3	-	3	25	-	3Hrs.	100	-	125

Pre-requisite	Source
4050	PRD

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	–	125

Rationale: Engineering trainee should have an extensive background information and in depth understanding of the production processes and various machine tools used in industry. This subject will provide the working knowledge of various machine tools and safety aspects.

Competencies to be developed through this course - Select proper types of tools and accessories for different types of operation. Select the suitable working speed, feed, depth of cut for different types of operations. Identify the various operations to be performed to produce a finished component.

COURSE CONTENTS	Hrs	Mks
1. DRILLING	7	16
Introduction and types of drilling machine. Size of drilling machines. Main parts and working of following drilling machines - Sensitive, upright, radial drilling machine, gang and multi-spindle drilling machine. Work holding devices - T-bolt and clamps, drill, press vice, step block, v – block angle plate and drill jig, its uses. Tool holding devices -Spindle, sleeve, socket, drill-chuck and tapping attachment, uses of each holding devices. Drill machine operation - Drilling, reaming, boring, counter-boring, counter-sinking, spot-facing, tapping and trepanning. Cutting speed, feed and machining time-Definitions and calculation of cutting speed and machining time in drilling. Safety precaution while working on a drilling machine.		
2. BORING	7	12
Introduction and types of boring machines. Size of horizontal boring machine. Main parts and working of horizontal boring machine. Boring tool mountings for horizontal boring -Boring bar - Boring head and facing head and its uses. Main parts and working of vertical boring machine, vertical boring machine operations. Main parts of jig boring machine and its uses.		
3. SHAPING	10	20
Introduction and classification of shaper. Size of standard shaper. Main parts of standard shaper and functions of each part. Shaper Mechanism - Crank and slotted link and hydraulic type only. Work-holding devices – T-bolts & clamp, V-block, vice, parallels, hold down, uses of each work holding devices. Shaper operations - Machining horizontal surface, vertical surface, angular surface, key-ways and slots. Cutting speed, feed, depth of cut and machine time - Definition and calculation of cutting speed and machining time. Safety precaution while working on a shaper.		
4. SLOTTING	6	12
Introduction and classification of slotter. Main parts and working of a slotter. Work holding devices and its uses. Slotter operations machining of flat surfaces, cylindrical surfaces, irregular surface slot, key-ways and grooves. Cutting speed, feed and machining time. Definition. Safety precaution while working on a slotter.		
5. PLANNING	6	12
Introduction & listing of different types of planer, size of planer, main parts of a double housing planner. Planer mechanism -Open & cross belt drive, reversible motor drive and hydraulic drive. Work holding devices - Heavy duty vices, T-bolt and clamp, step block, angle plate, planer jack, stop, stop pins, toe dogs and V- block, function of each holding device. Planner operation, machining of flat surfaces, vertical surfaces, angular surfaces, slots and grooves. Difference between shaper and planer.		

6. MILLING Introduction and classification of milling machine. Size of milling machine. Main parts of column and knee type milling machine and vertical milling machine and function of each main part. Work holding devices-T-bolt and clamps, vices, V-block & special fixtures and its uses. Cutter holding devices- Arbor, collet, adaptor, spring-collets and bolted cutter; functions of each holding device. Milling Cutters-Classification of cutter, standard milling cutter-Plain, side, metal slating saw, angle, end mill, wood-ruff key slot, fly and form cutters; uses of each cutter. Fundamental of milling processes – Up-milling and down-milling. Milling machine operation – Plain milling, face milling, side milling, straddle milling, angular milling, gang milling, form milling, end milling, gear cutting and key way milling. Cutting speed, feed, depth of cut, number of teeth on a milling cutters and machining time - Definition and calculation of cutting speed and machining time. Safe work habits in milling machine operation.	12	28
Total	48	100

REFERENCE BOOKS

1. Workshop Technology Vol. I & II by Hajra Chowdhary.
2. Workshop Technology Vol. I & II by Chapman
3. Production Technology by R.K. Jain