

AMAC-4 WORKSHOP PROCESSES

UNIT-1 THE LATHE

1.1 Introduction, Functions, Types, Descriptions & Functions of Lathe Parts, Lathe Accessories & attachments, lathe Operations.

UNIT-2 MILLING MACHINES

- 2.1 Classification and types; Size and specifications; Accessories attachment; Milling cutters; Classification and types of milling cutter.
- 2.2 Nomenclature of cutter; Setup-operation ; Method of feeding work piece; Operation on milling machine;
- 2.3 Indexing (simple compound, differential angular) ; Helical milling cam milling ; Cutting speed & ledge ;
- 2.4 Machining time calculation; Milling operation compound with other operations

UNIT-3 GRINDING MACHINE

- 3.1 Types of grading machines (Floor stand, Precision. Plain, cylindrical, universal centrals Internal, surface disc);
- 3.2 Special grinding machine, (Tool and cutter grinder, cam and shape grinders); Shape of grinding wheel; Grinding wheel designation as per- IS -551 -19-54;
- 3.3 Grinding wheels; grinding wheel elements (abrasives - its types, Grain sizes, Grade, structure, bonding material etc.);
- 3.4 Diamond wheel; Grinding wheel section; Allowances for grinding wheel; Mounting of Grinding wheel; Dressing and cursing, of grinding wheel

UNIT-4 BORING, BROACHING AND SAWING MACHINE

- 4.1 Types of Boring machine ; Boring haps and heads; Various operations using boring heads; Boring operations using end supports;
- 4.2 Types of broaching machine; broaching tool nomenclature; broaching options compared with other process (advantages & limitations.);
- 4.3 External; Lubrication and cooling; Application of Broaching

UNIT-5 GEAR MANUFACTURING

- 5.1 Gear tooth element; Materials for Gears; Different methods of Gear manufacturing ; Gear generating methods; Gear milling,
- 5.2 Gear shaping (Working principal of machine tool required Gear shaping cutters etc.);
- 5.3 Gear Hibbing (Working principal of machine tool required Gear hobbing operation) ;
- 5.4 Gear finishing process (Gear sharing burnishing, grinding honing lapping

UNIT-6 METAL FINISHING PROCESS

- 6.1 Honing; Description and construction of honing tool.; Application of honing process;
- 6.2 Lopping; Description of Lapping compound and tool; Application of Lapping ;

6.3 Super finishing process burnishing, Polishing, Buffing; Application of super finishing operations.

UNIT-7 PATTERN MAKING

7.1 Pattern Materials, Pattern Making Tools, Pattern Allowances, Types of Patterns, Solid or Single Piece Pattern, Split Pattern, Match Plate Pattern, Cope and Drag Pattern,

7.2 Loose Piece Pattern, Gated Pattern, Sweep Pattern, Skeleton Pattern, Shell Pattern, Segmental Pattern, Follow Board Pattern, Lagged-up Pattern,

7.3 Left and Right hand Pattern, Core Boxes, Colour coding for Pattern and Core Boxes.

UNIT-8 MOULDING AND CORE MAKING

8.1 Moulding Materials, Moulding Sand, Sand Binders, Sand Additives, Properties of Moulding Sand, Classification of Moulding Sand,

8.2 Grain Shape and Size of Sand, Preparation of Moulding Sand, Types of Moulding Sand, Moulding Processes,

8.3 Methods of Green Sand Mould by Turn Over Method, Gates and Risers, Types of Gates,

8.4 Moulding Methods with Typical Patterns, Cores, Types of Cores, Core Binders, Core Making, Core Setting, Core Shifting and Chaplets.

UNIT-9 CASTING PROCESSES

9.1 Permanent Mould Casting, Semi-permanent Mould Casting, Slush Casting, Die Casting, Centrifugal Casting, Investment Casting, Shell Moulding Process,

9.2 Continuous Casting, Defects in Casting, Cleaning of Castings, Inspection of Castings, Design of Castings.

UNIT-10 WELDING

10.1 Weldability, Advantages and Disadvantages of Welded Joints, Types of Welded Joints, Cold Pressure Welding, Fillet Welded Joints, Edge Preparation and Applications, Welding Positions,

10.2 Black Smith's Forge Welding, Electric Resistance Welding, Spot Welding, Roll Spot and Seam Welding, Projection Welding, Butt Welding, Percussion Welding,

10.3 Arc Welding, Polarity in Arc Welding, Electrodes for Arc Welding, Arc Welding Equipment, Arc Welding Processes, Carbon Arc Welding, Metal Arc Welding,

10.4 Metallic Inert-gas (MIG)Arc Welding, Tungsten Inert-gas (TIG)Arc Welding, Atomic Hydrogen Welding, Stud Welding, Submerged Arc Welding, Plasma Arc Welding, Flux Cored Arc Welding, Electro-slag Welding, Electro-gas Welding,

10.5 Thermit Welding, Solid State Welding, Modern Welding Processes, Basic Weld Symbols, Supplementary Weld Symbols, Elements of a Welding Symbol, Standard Location of Elements of a Welding Symbol,

10.6 Gas Welding, Equipment for Oxy-acetylene Gas Welding, Welding Rods, Fluxes, Gas Flame, Gas Welding Technique, Gas or Oxygen Cutting of Metals, Cutting Machines, Oxygen Lance Cutting,

10.7 Arc Cutting, Oxygen Arc Cutting Process, Welding of Various Metals, Testing of Welded Joints, Braze Welding, Soldering, Brazing.

UNIT-11 RECENT DEVELOPMENT IN MANUFACTURING PROCESS

11.1 Working of NC Machines tools, Classification of NC Machines, Programming for NC Machines, Methods of Listing the Co-ordinates of points in NC System,

11.2 Application of NC Machine, Advantages & Disadvantages, Computer Numerical Control & Direct Numerical Control.

UNIT-12 METAL CUTTING AND CUTTING TOOLS

12.1 Types Of Cutting Tools, Measurement Of Forces, Types Of Chip

12.2 The Cutting Action Of Hand Tools, Tool Life And Water, Machinability, Cutting Tool Materials, Cutting Fluid

UNIT-13 DRILLING MACHINES

13.1 Types Of Drilling Machines, Tools Holding Devices, Drilling Machine Operations,

13.2 Types Of Drills, Twist Drill Nomenclature, Drill Material, Reamer

UNIT-14 SHAPER, PLANNER AND SLOTTING MACHINE

13.1 Principal parts, planner, planning machine parts, shaper vs. Planner, slotting machines, Slotting machine parts, slotter operations, slotter tools

Reference Books:

1. Workshop Processes, Practices and Materials by Bruce J. Black
2. Elements Of Workshop Technology Vol-1 by Choudhury H S K
3. Workshop Technology, Vol. I by W A J Chapman
4. Elements Of Workshop Technology Vol 2 Machine Tools by Choudhury S K