**Lesson Plan**

**Subject : Production Technology**

Lesson plan : 15 Weeks

Work load (lecture/Practical) per week (in hours): Lectures:3 hours, Practical:2 hours

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| **Lecture No** | **Theory** | **Practical** |
| **Practical Day** | **Topic** |
| 1 | Overview of machining technology: types of machining operation, cutting tools, cutting conditions | 1 | To prepare a job on a lathe having various operations viz. drilling, boring, taper turning, thread cutting, knurling, etc. |
| 2 | Theory of chip formation in metal cutting: orthogonal cutting model, actual chip formation,  |
| 3 | forces relationships and the merchant equation: forces in metal cutting, the merchant equation |
| 4 | Power and energy relationships in machining, cutting temperatures. |
| 5 | Turning and related operations: cutting conditions, operations related to turning | 2 | To cut external threads on a lathe machine. |
| 6 | Engine lathe, other lathes and turning machines, boring machines, drilling and related operations |
| 7 | cutting conditions, operations related to drilling, drill presses,  |
| 8 | Milling: types of milling operations, cutting conditions, milling machines, high speed machining |
| 9 | grinding machines: types, wet and dry grinding, abrasives, grit, grade and structure of wheels | 3 | To calculate the machining time for cylindrical turning on a lathe and compare with the actual machining time. |
| 10 | selection of grinding wheels. |
| 11 | Tool life, tool wear, taylor tool life equation, tool materials: high speed steels |
| 12 | cast cobalt alloys, cemented carbides, cermets and coated carbides, ceramics, |
| 13 | synthetic diamonds and cubic boron nitrides, tool geometry: single point tool geometry | 4 | To prepare a useful product containing different types of welded joints using simple TIG/MIG welding set. |
| 14 | Effect of tool material on tool geometry, multiple-cutting-edge tools,  |
| 15 | cutting fluids: types of cutting fluids, applications and selection of cutting fluids. |
| 16 | Limits, fits, and tolerances, gauge design, interchangeability, linear, angular, and form measurements  |
| 17 | (straightness, squareness, flatness, roundness, and cylindricity) by mechanical and optical methods, inspection of screw threads | 5 | To cut gear teeth on milling machine using dividing head. |
| 18 | surface finish measurement by contact and non-contact methods, |
| 19 | Tolerance analysis in manufacturing and assembly. |
| 20 | Standard forms of screw threads, methods of making threads, thread cutting on lathe |
| 21 | Thread chasing, thread milling, thread rolling, thread grinding, thread tapping | 6 | To cut v groove using a shaper |
| 22 | Automatic screw cutting machines, inspection and measurement of threads. |
| 23 | Introduction, conventional fixture design, tool design steps, clamping considerations, chip disposal |
| 24 | unloading and loading time, example of jig design, types of jigs |
| 25 | conventional fixtures, modular fixturing, setup and changeover: single-minute-exchange-of-die (SMED), | 7 | To study of Orthogonal & Oblique Cutting on a Lathe. |
| 26 | workholding devices: assembly jigs, magnetic workholders |
| 27 | electrostatic workholders, economic justification of jigs and fixtures. |
| 28 | Introduction to different types of gears, terminology, methods of gears manufacturing |
| 29 | gear forming: selecting a form gear cutter for cutting spur gears, selecting gear cutter for cutting helical or spiral gear | 8 | To demonstration SLOT Milling. |
| 30 | broaching of gears, generating methods: gear shaper process |
| 31 | rack planning process, gear hobbing process. |
| 32 | Gear finishing operations: Shaving, burnishing, grinding, lapping,  |
| 33 | lapping, honing, gears inspection. |  |  |
| 34 | Classification of CNC machines, modes of operation of CNC, Working of Machine Structure |
| 35 | Automatic tool changer (ATC), Automatic pallet changer (APC), CNC axis and motion nomenclature |
| 36 | CNC toolings – tool pre-setting, qualified tool, tool holders and inserts, Axes Identification in CNC turning and Machining centers |
| 37 | CNC part programming: Programming format and Structure of part programme,  |  |  |
| 38 | ISO G and M codes for turning and milling- meaning |
| 39 | Applications of important codes. |