(2) *Heat Treatment.*—The relation between heat treatment and the physical properties of plain carbon steels. The effect of carbon. Critical temperatures. Hardening, tempering, annealing, normalizing, and case-hardening. Types of furnaces. Temperature measurement and control. Quenching media.

(3) *Manufacturing Processes.*—An outline of the preparatory processes for forming materials—*e.g.*, pattern making, moulding, and casting; forging, spring-making, drop stamping and die-casting; rolling and drawing metal bars; dishing, drawing, and embossing sheet metal; sheet-metal work, including pressing, spinning, extruding; riveting and general principles of boiler-making; brazing and soldering; welding and cutting by arc and oxy-acetylene blow-pipe flame; gear-manufacture.

(4) *Measuring, Gauging, Inspection.*—General principles of interchangeable production and limit gauging. B.S.I. and N.Z. Standards. Systems of limits and fits for plain and screwed work. Tolerances, limits; clearance, interference, and transition fits. Tolerances associated with different machining operations.

Types of limit gauges. Advantages of adjustable gauges. Measuring equipment. Construction, care, and use of surface plates, straight-edges, squares, micrometers (external and internal), vernier calipers, and height gauges, dial gauges, rules, and protractors. Basic standard of length. Imperial standard yarn. International standard metre. Conversion factor. Standard and workshop end gauges; their accuracies and uses.

(5) *Cutting Tools.*—Cutting action of tools such as hand tools; lathe tools (including tipped tools); drills; reamers; milling cutters; dies; taps; tool angles for different materials and purposes; measurement of tool angles. Cutting speeds and feeds. Estimation of machining times.

(6) *Machine Tools.*—Fundamental principles in the production of machine surfaces. Copying or forming and generating. Principal features of construction and functions of the more important general purpose machines, such as lathes; sensitive, vertical, and radial drilling machines; shaping, slotting, planing, and boring machines; plain milling machines and accessories; capstan and turret lathes; grinding and lapping machines. Chatter and the use of steadies.

Lubrication. Types of lubricants. Types and uses of cutting oils and solutions. Selection and methods of application.

(7) *Safety Measures.*—Sources of danger and methods of protection. Types of guards and safety devices. New Zealand regulations.

(8) *Operation Planning.*—Planning the operation layout, and estimation of floor-to-floor times for simple machined parts.

A candidate in this subject will be required to present a certificate from the Principal of the institution attended that he has carried out a course of practical work of at least forty-five hours' duration based on the above prescription and that his attendance and work have been satisfactory.