Module 1

Syllabus :

1.1 Metal Cutting Theory : Orthogonal and oblique cutting, various types of chips, Mechanics of orthogonal steady state metal cutting, shear plane and shear plane angle, Merchant's force circle, stresses, shear strain, velocity relations, rate of strain, energy considerations, Concept of specific power consumption in machining, Ernst and Merchant's model & modified model for orthogonal cutting, problems on above topic.

1.2 Dynamometry : Dynamometer requirements, force measurement, electric transducers, strain gauge lathe dynamometer, strain rings, milling dynamometer, drilling dynamometer, piezoelectric dynamometry

Module 2

Syllabus : Heat generation in metal cutting, heat transfer in a moving material, temperature distribution in metal cutting, effect of cutting speed on temperature, prediction of temperature distribution in machining, measurement of cutting temperature, work tool thermocouple, direct thermocouple measurement, radiation methods, hardness changes in steel tools, Cutting fluid types, the action of coolants, the action of lubricants, characteristics of an efficient lubricant in metal cutting, application methods of cutting fluid, dry cutting and minimum quantity lubrication, cryogenic cooling, cutting fluid maintenance and environmental considerations, disposal of cutting fluids.

Module 3

Syllabus :

3.1 Properties of cutting tool materials, Major tool material types, Plain carbon steel, high speed steel, cast alloys, cemented tungsten carbide, titanium carbides, ceramic and cermet tools, synthetic diamond, polycrystalline diamond (PCD), cubic boron nitride (CBN), coated tools, Techniques for manufacturing coated tools

3.2 Measurement and specification of surface finish, primary cutting edge finish, fracture roughness, BUE formation and its influence on finish, secondary cutting edge finish.

Module 4

Syllabus :

4.1 Definition, tool wear, criteria for tool failure, effect of cutting parameters and tool geometry on tool life, Taylor's tool life equation, machinability of material, factors affecting machinability.

4.2 Components of product cost, Optimum cutting velocity for minimum cost of production and maximum production rate, problems on above topic.

Module 5

Chapter 5 : Design of Single Point Cutting Tools 5-1 to 5-39

Syllabus : Different systems of tool nomenclature like MRS and ORS, Constructional features of solid tool, tipped tools, mechanically held regrindable insert type tools and throw away tip type tools, Design of shanks, cutting tip and chip breakers for HSS and Carbide tools, ISO coding system for tipped tools and tool holders, Tool design for EDM and USM

Module 6

Syllabus : Introduction to various form tools, Broach nomenclature, design steps for circular pull type, key way and spine broaches, Design of face and peripheral milling cutters, Drill, Reamer and Tap design using standard procedure

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