

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)

w.e.f. 2014-15

3rd Semester

MET-601

Non-Conventional Machining

L T P
3 1 0

Theory: 75
Sessionals: 25
Time:03 Hours

Instructions: There will be eight (8) questions in total, two from each unit. Students are required to attempt any five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: Introduction, Arc & Beam Processes

Need for advanced machining processes; an overview of Modern machining processes

Ion Beam and Plasma Arc Machining- Principle, beam Source, equipment, process characteristics, advantages and applications.

Unit 2: Machining Methods

Material, process characteristics, material removal rate, limitations, applications.

Operating Principles: Abrasive Jet Machining; Water Jet Machining; Ultrasonic Machining, process characteristic, advantage and application.

Unit 3: Chemical Machining Methods

Chemical Machining- Chemical Milling, Electrochemical Deburring, principle, equipment, advantages and applications.

Electro-Chemical Machining –ECM, ECG, Electrostream Drilling, Principle, analysis of material removal, electrolytes and electrolyte system, tool design and applications.

Unit 4: Thermal Machining Methods

Electric Discharge Machining- Laser Beam Machining, EDM- Principle, equipment, tool design, process characteristics and application.

Electron beam Machining-Principle, power source, types of lasers, equipment, Process characteristics, advantages and applications.

Recommended Books:

1. Nonconventional machining; Misl P.K., Institution of Engineers (I) Text Book Series; Narosa Publishing House, New Delhi 1097
2. Modern machining processes; Pandey P.C. & Shan H.S Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1998
3. Production technology; Gangopadhyay A.K.,Ramananda B.S. Ranganathen M.V., HM T Bangalore, Tate McGraw-Hill Publishing Co. Ltd., New Delhi,
4. Principles of electro-chemical machining; McGeogh J.A., Chapman and Hail, London,1974
5. Laser in machining; Chryssolous G., Springer Publicatian,.1991

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)
MET-603
Production Planning and Control

L **T** **P**
3 **1** **0**

Theory:75
Sessional:25
Time: 3 Hours

Instructions: There will be eight questions in total, two from each unit. Students are required to attempt any five questions selecting at least one from each unit. All questions will carry equal marks.

Unit:1 Introduction & MRP

Introduction to Production System:- Aim of production system, Types of Production system Manufacturing Planning & Control systems, management problems, techniques and system, the data base, a frame work for MPC system.

Material Requirement Planning:- Material requirement planning in MPC, MRP-I, MRP-II, the basic MRP record, technical issue, processing frequency, lot sizing, safety stock and safety lead time, the MRP data base, using the MRP system.

Unit 2: Planning for Production:

Importance, Capacity planning, Capacity utilisation, role of capacity planning in MPC system, management and capacity planning, aggregate planning, data base requirements in capacity planning,

Systematic layout planning: - Introduction, Objective & Types, Comparison & Application of Different types of layout, layout of facilities, job design, and work measurement.

Unit3: Master Planning Schedule & Control:

Master planning Schedule:-Introduction, Master production scheduling activity, the MPS environment, MPS technique, bill of material structure for MPS, the final assembly schedule.

Shop Floor Control:- Shop floor control techniques, shop floor control data base, using the shop floor control system shop floor control system with MPC system linkage.

Unit 4: Management Techniques:

Demand management in MPC, JIT in MPC system, implementation of MPC system, quality management.

Supply chain management:- Supply chain management, strategies for manufacturing excellence, Reliability Engineering, reliability optimization, method of reliability evaluation.

Suggested Books:

1. Manufacturing planning and control system, Thomas E. Vollmann, Bery and Whybark, Golgotia Publication, Greater Noida.
2. Production and Operation management, Chary, Tata McGraw Hill, New Delhi.

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)
MET-605

Advance Material Science

L T P
3 1 0

Theory: 75
Sessional: 25
Time: 3 Hours

INSTRUCTIONS: There will be eight questions in total, two from each unit. Students are required to attempt any five questions selecting at least one from each unit. All questions will carry equal marks.

UNIT 1: Mechanical Fundamentals & Theories of Dislocation

Mechanical Fundamentals:- Stress and Strain in materials, Elastic and plastic behaviour, concept and types of stress, True stress and true strain, Tensile deformation of ductile metals, concept and types of strain, Concepts of failure in metals.

Theory of Dislocation & Crystal Structure:- Crystal structure of iron and common metals, Crystal imperfections. Dislocation sources, Forces on dislocations, intersection of dislocations, Deformation by slip and twinning, Critical resolved shear stress for slip,

UNIT 2: Strengthening & Testing of Mechanical Properties

Strengthening Mechanisms:- Strengthening by grain refinement & grain boundaries, Solid solution strengthening, Dislocation strengthening, Precipitation strengthening, Transformation strengthening, Effect of alloying elements in steel.

Testing and interpretation of Mechanical Properties:- Tensile, Compressive, Torsion, Toughness, Fatigue and Creep, Properties and applications of major engineering steels, metals and alloys.

UNIT 3: Failure Theories in Metals

Fracture:- Basic concepts, Griffith theory of brittle fracture, Types of fracture in metals, Ductile fracture, Notch effect, fracture toughness design, Factor affecting impact on transition temperature.

Fatigue of metals:- Basic concepts, S-N curve, Low cycle fatigue, Strain life equations: size and surface effects on fatigue, Effect of metallurgical variables on fatigue.

UNIT 4: Cutting Tool and Bearing Materials

Cutting Tool materials- Properties & classification: Carbon tool steels, High speed steels, Cobalt base alloys, Cemented carbides, Titanium carbide and titanium nitride, cemented oxides, Diamond tools, Surface treatment of tools, Hot work tool steels, Shock resisting steels,

Bearing Materials:- Introduction to Bearing, Principles of operation, Types of Bearings & their Materials.

Recommended Book:

1. Mechanical Metallurgy: Dieter G.E., McGraw Hill Book Company.
2. Materials Science and Engineering: Callistor, W.D. John Wiley & Sons.
3. Materials Science and Engineering: Raghavan V, Prentice Hall of India, New Delhi.
4. Production Technology: Gangopadhyay A.K, Ramananda B.S, Ranganathan M.V, HMT Bangalore. Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
5. Manufacturing Science: A. Ghosh, A.K. Mallik, East West press New Delhi, 2002
6. A text book of Engineering Materials and Metallurgy, J.T. Winowlin Jappes, A. Alayudeen, N. Venkateshwaran, Laxmi Publications, 2006.

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)
MET-625

Computer Numeric Control

L T P
3 1 0

Theory: 75
Sessional: 25
Time: 3 Hours

INSTRUCTIONS: There will be eight questions in total, two from each unit. Students are required to attempt any five questions selecting at least one from each unit. All questions will carry equal marks.

UNIT 1: Numerical Control for Machine Tools:

Basic concepts of NC, Use and Advantages of NC in machine tools, Structure of NC system, Economics of NC for machine tools.

Constructional details of NC machine tools, Machine structure and its functions, Methods to improvise accuracy and productivity using NC.

UNIT 2: NC Machine Actuation and Control

Elements of NC Machine: Input Device, Machine Control unit, Machine Tool, Driving System, Feedback devices, Display Unit. Coating devices and ADC interpolator systems. Actuators: Optical, Pneumatic, Hydraulic Electro-chemical and Electromagnetic.

Incremental and Absolute system: Definition and Designation of control axes, tool and zero pre-setting, work holding and setting of NC machine.

UNIT 3: CNC, DNC and Adaptive Control:

CNC, DNC, Adaptive Control (AC): Structure, Types, Uses and Benefits. Problems with conventional NC, advantages of CNC.

Combined CNC/ DNC systems control systems for position control and tool changing systems, Digital computer and it's functioning for machine control, Microprocessor in CNC.

UNIT 4: Tooling For NC Machines

Cutting Tool Material, Applications for various cutting tool materials, Flexible tooling, Tool path simulation on lathes and milling.

Turning tool geometry: ISO coding system for tungsten carbide inserts used in turning, Milling Tooling Systems, Tool pre-setting, automatic tool changers, Work holding.

Suggested books:

1. Numerical control and computer aided manufacture, T.K. kundra, P.N. Rao, TMH Delhi
2. CND machines, S.P. Patla, M.Acithan, Alley eastern, New Delhi.

**MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)
MET-607**

Dissertation Comprehensive

L T P
0 0 4

Sessional: 100

A student is required to initially work on Literature survey/problem formulation / adopted methodology/ Industry selection / etc. on some latest areas of Mechanical Engineering or related field. A seminar must be presented by students to DRC based on the synopsis submitted for the dissertation.

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)

MET- 609

Advance Manufacturing Lab

L T P
0 0 4

Practical : 50
Sessional :25
Total : 75 Marks

1. To study the construction feature and working of CNC Vertical Milling machine.
2. To generate a CNC Vertical Milling machine code program for slab milling and stimulate the program for a job.
3. To generate a CNC Vertical Milling machine code program for spur gear generation and stimulate the program for a job.
4. To study the construction feature and working of CNC lathe trainer.
5. To generate a CNC codes program for turning, facing and step turning and simulate the program for a job.
6. To generate a CNC code program for grooving, threading, drilling and stimulate the program for a job.
7. To check the quantity of clay and binder in the molding sand by using clay washer model.
8. To study the composition of molding sand using different testing equipments.
9. To study the working of gear hobbing machine and cutting a spur gear on it.

Note: The students must perform eight experiments.

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)
MET-611
Tribology Lab

L T P
0 0 4

Practical : 50
Sessional :25
Total : 75 Marks

1. To analyze the various properties of lubricants with the help of Viscosity Tester.
2. To study the pressure distribution on Journal Bearing in Journal Bearing Apparatus.
3. To analysis the surface roughness of different materials by using Surface Roughness Tester.
4. To study the various temperature characteristics of lubricant.
5. To determine the rate of wear of metallic pin using friction & wear monitoring apparatus (pin on disc).
6. To study the geometry of elastic bodies in contact (over convex surface).
7. To study the geometry of elastic bodies in contact (over one convex and one flat surface).
8. To study the various types of Bearings used in industries.
9. To analysis the approximate solution of Reynolds's equation with simultaneous Elastic Deformation and Viscosity rise.
10. To determine the rate of wear of single point cutting tool using weighing method.

Note: the students must perform at least eight Experiments.

MASTER OF TECHNOLOGY (MANUFACTURING TECHNOLOGY)

4th semester w.e.f. 2014-15

MET-602

Thesis and Comprehensive Viva-voce

L T P

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Practical : 100

Sessional : 100

Total : 200 Marks

A student is required to work for one semester for analysis/synthesis/designing/development etc. in some latest areas of Mechanical Engineering which have been finalized in the third semester. The student will be evaluated by internal as well as external examiner based upon his/her research work.

Every dissertation will be evaluated by the DRC of the respective department and an external expert appointed by the university. Each year the College running the course will send the list of eligible students along with the topic name to the Chairman, Board of Studies in Mechanical Engineering for nominating external examiner. Any delay caused due to late submission of the student list along with the topics name will be the responsibility of the respective Director of the Institute. In the absence/refusal of examiner, the same process will be followed and the alternate examiner will be deputed by the Chairman, Board of Studies, Kurukshetra University Kurukshetra.